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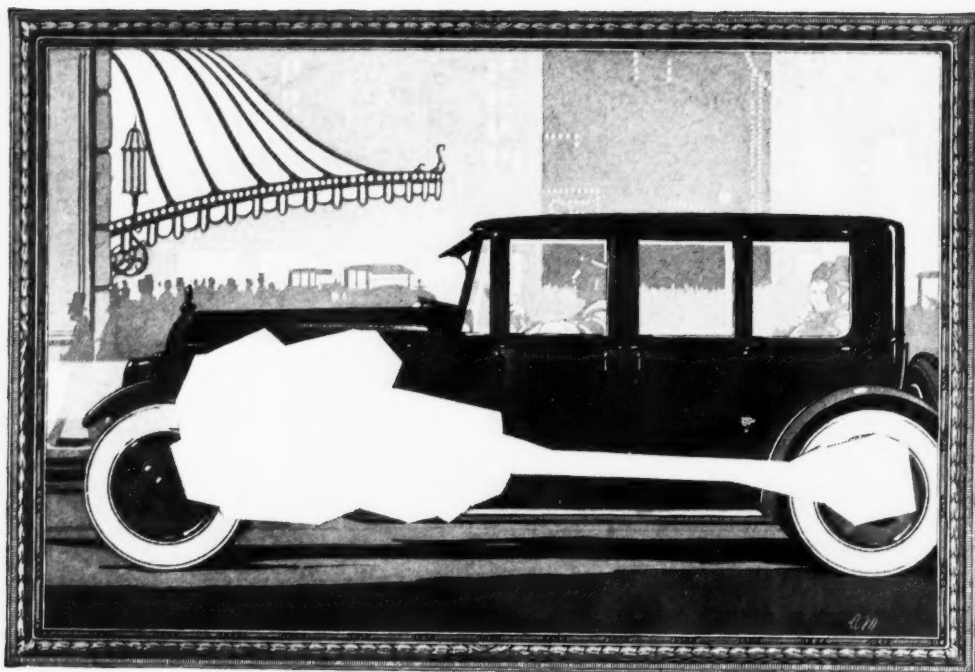
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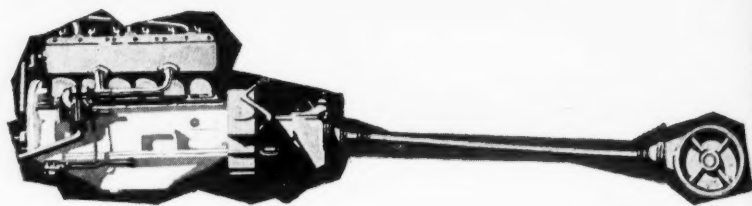


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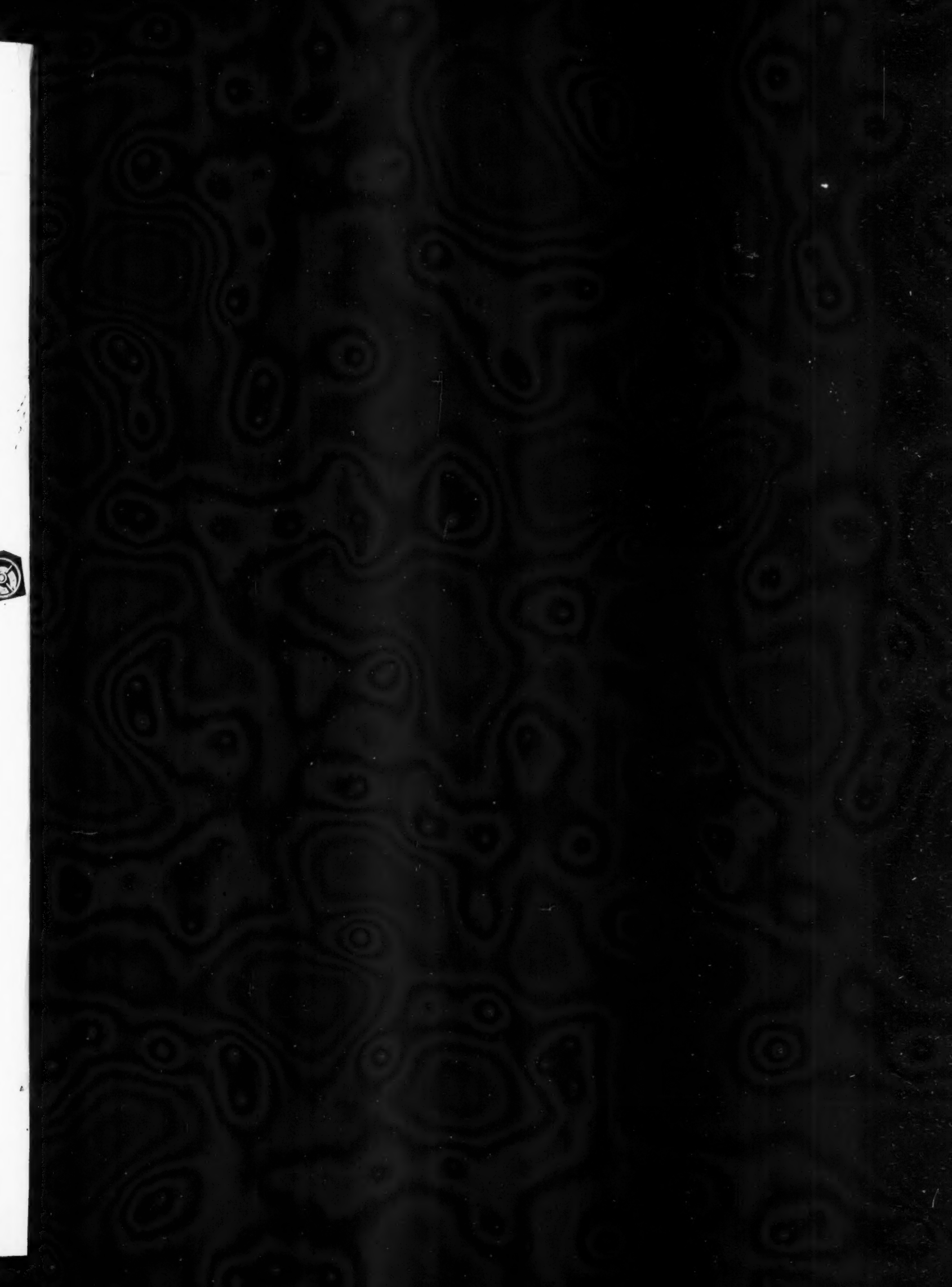
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No. 1

Service and Sales Are Bound Together Inseparably

No company can establish permanent market for its products unless they are serviced decently. Parts makers trying to give practical help in solving big problem. Steps already taken are in right direction but much remains to be done.

By James Dalton

FROM a practical point of view, sales and service of cars and trucks are bound together so closely it is hard to tell where one begins and the other ends. There can be no permanent market for any vehicle on which good service is not given.

With so many motor vehicles in use, sales to first buyers are not so important as they once were. It is the permanent replacement business for which manufacturers will compete most keenly in both the passenger and freight fields. It is service which will assure repeat orders.

The biggest of the truck companies are banking on this fact. They are out for all the business they can get, but it does not worry them especially when a smaller rival sells some one his first truck. They are operating on the theory that there are a great many companies which give such atrocious service on the commercial vehicles they make that the person who buys one of them as his first venture will become so disgusted that when he wants another he will turn to some make on which he knows he can get the kind of service he wants.

Much the same condition prevails in the passenger-car field. It frequently applies to cars not in the assembled list. This is one of the penalties of sales on a national basis. Uniformity of service is not possible for all dealers are not equally good. We know

of many cases in which owners are entirely satisfied with the cars they are driving, but who assert emphatically—and often profanely—that they never will buy another of the same make because the service in their particular town is so unsatisfactory. It may be good in a neighboring city or village, but that doesn't help them.

THE industry is making some progress in its efforts to improve service, but complaints about extortionate prices for inferior work still are heard throughout the country. No detective is needed to find out the chief bane of the motorists' existence. Most of them are pretty well satisfied with the car they drive, but the ones who are pleased with the service they get are almost as scarce as hen's teeth.

When a man buys a car in a certain price class and then switches to another in the same price class when he buys again, it's a pretty safe bet that it is because of service—or lack of it.

A great deal of language has been used, all kinds of language, in reference to service, but it needs something more than words. It can't be made a game of passing the buck. Genuine improvement must start at the factory. The service manager must be one of the most important cogs in the machine and he should be given a salary commensurate with his re-

sponsibilities. Too often he seems to be regarded as a sort of super stock clerk. His should be made a regular job and it will be—eventually.

THE factory which makes it possible for the purchaser of every vehicle it turns out to get good, dependable, honest service, at a fair price, will be building good will and future sales faster than an army of able salesmen can do it.

These observations apply to the industry generally but with especial emphasis to the assembled truck. The parts makers have done much more than the manufacturers themselves to provide any kind of service. They long have realized that unless more attention was given to service the public would give the assembled vehicle, particularly the truck, a black eye.

Laying up a passenger car for repairs always means inconvenience, but not always an actual money loss, although the repair shop often takes a week to turn out a job which should be completed within a couple of hours. Whenever a truck is out of commission longer than should be necessary, however, it means an actual loss of profits or of business. The owner not only has to pocket this loss but he usually has to pay more for the service when he gets it than it is worth. When a man is stung twice in one operation he usually gets so sore that he won't go back for the same treatment if there's any possible way of avoiding it. This is why the companies which give real service get the lion's share of business.

Parts makers are in business to sell parts. They know their products are good and they naturally want the biggest market obtainable. They know that persistently and perennially poor service will do more than anything else to curtail demand for assembled vehicles. A few of them took the bull by the horns a year ago and determined that if the manufacturers couldn't or wouldn't make it possible to obtain replacement parts expeditiously, at a fair price, they would.

The result was the establishment by a few makers of major units of a chain of service stations at which anyone needing them could obtain a supply of replacement parts at fair prices. Back of this plan was a desire to get more business, but it also gave recognition to the fundamental business principle that lasting success cannot be achieved without service.

Not all the assemblers of vehicles in which these parts are used were pleased with the service station system. They had made considerable money on the re-sale of replacement parts and they were reluctant to give up this source of revenue at a time when funds were needed. Such profits as these do not build business, however.

This chain of service stations will not solve the service problem, although it is a step in that direction. There is growing recognition, even by manufacturers whose parts are serviced in them, that the full benefits of the idea cannot be garnered unless the makers of any reputable unit part can have his product carried.

It is felt that if these stations are to give a maximum of service they must stock several makes of engines,

transmissions, axles, etc., instead of only one line of each unit. In other words, it is believed that it will be more profitable in the long run to promote the popularity and serviceability of the assembled vehicle than to seek through this means larger sales for a comparatively few products.

This assuredly is a broad gage position to take. It bespeaks full recognition of the need for efficient service. It has, moreover, a material advantage for the users of assembled cars and trucks, for if many units were added to the lines carried sales would be increased tremendously and multiplication of such service stations would be justifiable, so that they would be within easy reach in all sections of the country.

Some parts makers believe this plan would solve the service question immediately, some believe it would eventually and a few are less sanguine, but all are convinced that it is far better than anything available up to this time.

The president of one important gear company voiced the view the other day that, while such a plan would be exceedingly helpful, the ideal solution would be for vehicle manufacturers, especially of trucks, to take up servicing on a broad scale themselves.

This man is convinced, like most straight thinking parts manufacturers, that in the future most companies which turn out assembled trucks, will localize their markets. Basing his idea on this assumption, he feels that six or eight or a dozen companies in the same general section of the country could consolidate their service efforts with profit to themselves and their customers.

Such a consolidation would have to be founded on mutual faith. With such a foundation, each company would subscribe a certain amount in cash, say \$25,000. This would be used as the working capital for a separate company which would be devoted to service. It then would be possible for this company to establish its own service stations and substations where they would do the most good.

Management of this company should not be left to subordinates, but should be in the hands of the executives of the individual companies acting as a committee unless they could find for general manager a man thoroughly familiar with the parts business and capable of directing a large enterprise. Even then the operations of the company should be watched most carefully with the one idea in mind of giving the best service possible to the users of the vehicles in the service combination.

IT is the contention of parts makers that no make of assembled vehicle should be sold in a territory larger than that in which the manufacturer can give adequate service. This may be one city, one state or several states, depending upon the resources of the assembler.

Producers of major units, while not in any sense acting in concert, have arrived at pretty much the same general conclusions. Their program is composed of two parts—sales and service, but they are bound together inextricably. They are going to promote the sale of

THIS article points out the intimate relationship between sales and service. Improvement in service must begin at the factory and the importance of the service manager's job must be recognized. It is contended that no company is justified in making sales in a territory larger than that in which it can give good service.

Parts manufacturers are alive to the seriousness of the situation and propose to give purchasers of their products, especially the smaller truck assemblers, as much practical aid as possible. Some of the things they have in mind are outlined in this story.

assembled vehicles in every legitimate way and they know the only way the market can be permanently and definitely expanded is by providing satisfactory service.

These manufacturers would much prefer to stick to their own business of making and selling the parts which go into motor vehicles, giving assemblers the benefit of their counsel and cooperation, but if they find they are not making definite progress by this policy they have a very large ace in the hole.

If assemblers fail to grasp the importance of selling and servicing along sane and sound lines, there is nothing to prevent the parts makers themselves from going into the assembling business on a large scale. Once they have established a chain or chains of service stations, it would be comparatively easy for them to acquire the space needed at strategic points and themselves assemble cars and trucks.

This would be done only as a last resort, however.

As we have pointed out before, the parts makers are in a position to shape rather definitely the future of the assembled vehicle. One powerful lever in their hands is the limitation of credit. Some of them even now are adhering strictly to payment in full in thirty days where sales are not made on a C. O. D. basis. When a purchaser fails to meet his obligations in the 30 days further credit is refused him. Credit risks should be scanned with utmost care.

Limited Resources

With business at its present level in the passenger-car field this is no particular hardship, but it is a little different in the truck field. Generally speaking, the resources of the assemblers of commercial vehicles are more limited than those of passenger-car builders. Consequently they have to play closer to the cushion and if they make a mistake in gaging their market accurately they are in trouble immediately.

It is companies such as these which the parts producers are particularly anxious to guide for they cannot survive unless they are operated carefully and skillfully. As the situation stands today, many of them are sinking their resources in attempting to sell an occasional truck in a score or more of points remote from the factory where little assurance of satisfactory service can be given purchasers.

If the same amount of money and effort were expended nearer home, where their products are better and more favorably known, the sales would be much more profit-

able and it would be possible to give fair service from the factory. Dealers could be supervised more carefully and given a greater degree of assistance by the factory.

With parts manufacturers assuming a more or less paternal attitude toward a considerable section of the truck assembling branch of the industry, they have a very definite obligation to their customers. Most of them recognize this obligation and are prepared to meet it. They are studying the problems of the truck assemblers as well as their own and are preparing to give practical aid.

Dealer Education Needed

Next to the need for localizing markets and giving service, the most pressing problems are the education of dealers and the used truck. When dealers are taught how to merchandise successfully the trading question will become much less pressing for it will be handled on a business basis.

These are two of the subjects parts men are giving close consideration for, after all, they are their own problems. The size of the market for assembled cars and trucks will be dependent upon the degree of success with which they are handled.

Another field in which parts producers can give practical assistance in the sale of assembled products is advertising. The smaller truck companies can ill afford to make large advertising appropriations. So far as general mediums are concerned, if they localize their sales, they should localize their advertising. The parts manufacturer, on the other hand, is operating on a national basis and should advertise to the industry on that basis. He can make the assembled vehicle a national institution while at the same time promoting the sale of his own product. He can do more than any one else to educate the automotive dealer to the value of assembled vehicles and to their sales possibilities. There is a crying need for such an educational campaign, and it would do more than anything else to popularize the assembled car and trucks.

AUTOMOTIVE INDUSTRIES has tried to emphasize the fact that there is a splendid future for the assembled vehicle as an agency of transportation. This branch of the industry is face to face with several serious problems, but none of them is insoluble. Earnest and patient cooperation by the interests involved will bring steady improvement and there is gratifying evidence that this cooperation is assured.

Stephens Cars in Two Lengths of Wheelbase

IN 1923 the Stephens Motor Car Co. will market two models instead of a single one, as in the past, but aside from a difference of 7 in. in the wheelbase, the two chassis are practically alike. On the shorter, 117-in. wheelbase chassis will be mounted the two-passenger roadster, five-passenger phaeton and five-passenger sedan bodies, while on the 124-in. wheelbase chassis will be mounted the four-passenger foursome, seven-passenger phaeton and seven-passenger sedan bodies.

Among the changes in chassis design may be mentioned the following: The radiator has been made an inch higher and slightly narrower at the top. A rectangular depression is formed in the front of the radiator into which the name plate is set. An aluminum heading is formed on the cowl and a similar bead is rolled on the radiator shell; the bonnet fits in between these two beads, which gives a better finished appearance.

Cowl lights of the shrouded-lens type are now furnished with a nickel-plate finish. The headlights are mounted on swivel brackets on the fenders, so arranged that by the release of one nut they can be swung to give the desired forward illumination. The stop light, tail light and bracket form a single unit. A rearrangement has been made of the instruments on the board. There is a central group under a glass cover comprising the ammeter, oil pressure gage and water jacket thermometer. The choke is on the left side of the board. The tools are now carried in the front door. There is a hinged shelf in this door which, when closed, is locked against theft, whereas when it is opened it provides a convenient shelf from which the tools may be taken and in which they may be laid down.

The Stromberg carbureter and the Delco ignition system have been adopted.

Steel Tubing Used for Framework of New Sedan Body

Sliding doors, aluminum panels, and loose seats feature new British design. Intended primarily for use with light car chassis. "Square front" causes step at back end of cowl.

TWO examples of an all-inclosed body with rather novel constructional features have recently been developed in England. The method of construction, which is intended chiefly for application to sedan bodies for light cars, is claimed by the makers to have the advantages of weighing less and costing less to produce than other systems.

The outstanding feature of the body is its framework, the sides, back and top being made of D-section steel tubing (1 in. across the flat side) on a foundation of 1 in. round tubing, the latter braced by three transverse members of flat steel. The units of this framing and foundation are joined by welding where they abut or pass over one another, and the completed structure has the appearance shown in Fig. 1. Examples recently shown had only one door opening, on the left side, but the scheme could also be applied to a two-door design.

The diagram mentioned indicates, by means of stipple shading, the aluminum paneling which is secured to the inside of the tubing, thus making contact with the flat side of the D; the panels are held in place by a series of small screws passing into the tubes, the joints being covered inside by beading. Separate panels are used, and they are separately renewable if damaged by impact in use. The actual roof covering is leather substitute, with a cloth ceiling. The body has no interior panels, the inside of the aluminum sheet being lined with leather substitute—or cloth at option—glued on to the sheet metal.

The seating arrangements are seen in Fig. 2, where, however, the left-hand front seat is not shown. It will be noticed that the front seats are separate chairs consisting of an oval section tubular frame with attached cushion and back rest. With a covering of carpet on the wooden floorboards, these seats are said to require no means of anchoring them, retaining their position by friction on the floor when the car is in use; but on linoleum or similar carpeting a clip at the front can be easily arranged, to provide fore and aft adjustment if needed.

The rear seats have a base consisting of a two-compartment wooden box serving for tools, etc., the cushions and back rests being separate units in this case also, the former merely resting upon the base and forming detachable lids. The back rests are hinged at their top edges to the tubular rail at mid-height and have a pair of arms projecting rearwardly from the bottom edge, these arms normally making contact with the rear panel and causing the back rest to be inclined at an angle conducive to passenger comfort. Behind the seat cushion (under the back rests) is a clear space 10 in. wide for small bags, parcels, etc.

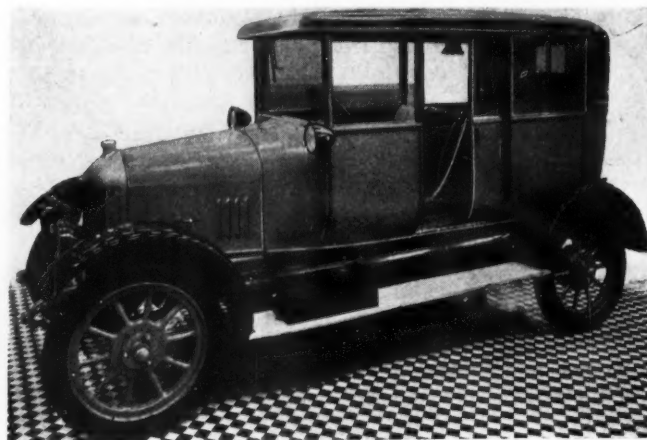
The seat cushions and back rests—both front and rear—are identical in size, shape and construction, consisting of a wood framing on which are mounted a series of loops or bridges of flat spring steel with transverse anchoring and spacing tubes, as shown in Fig. 3.

The spring steel loops are covered first with a padding of felt and then upholstered in leather substitute or cloth, the seats thus formed being quite comfortable, readily adapting themselves to the shape of the passenger and

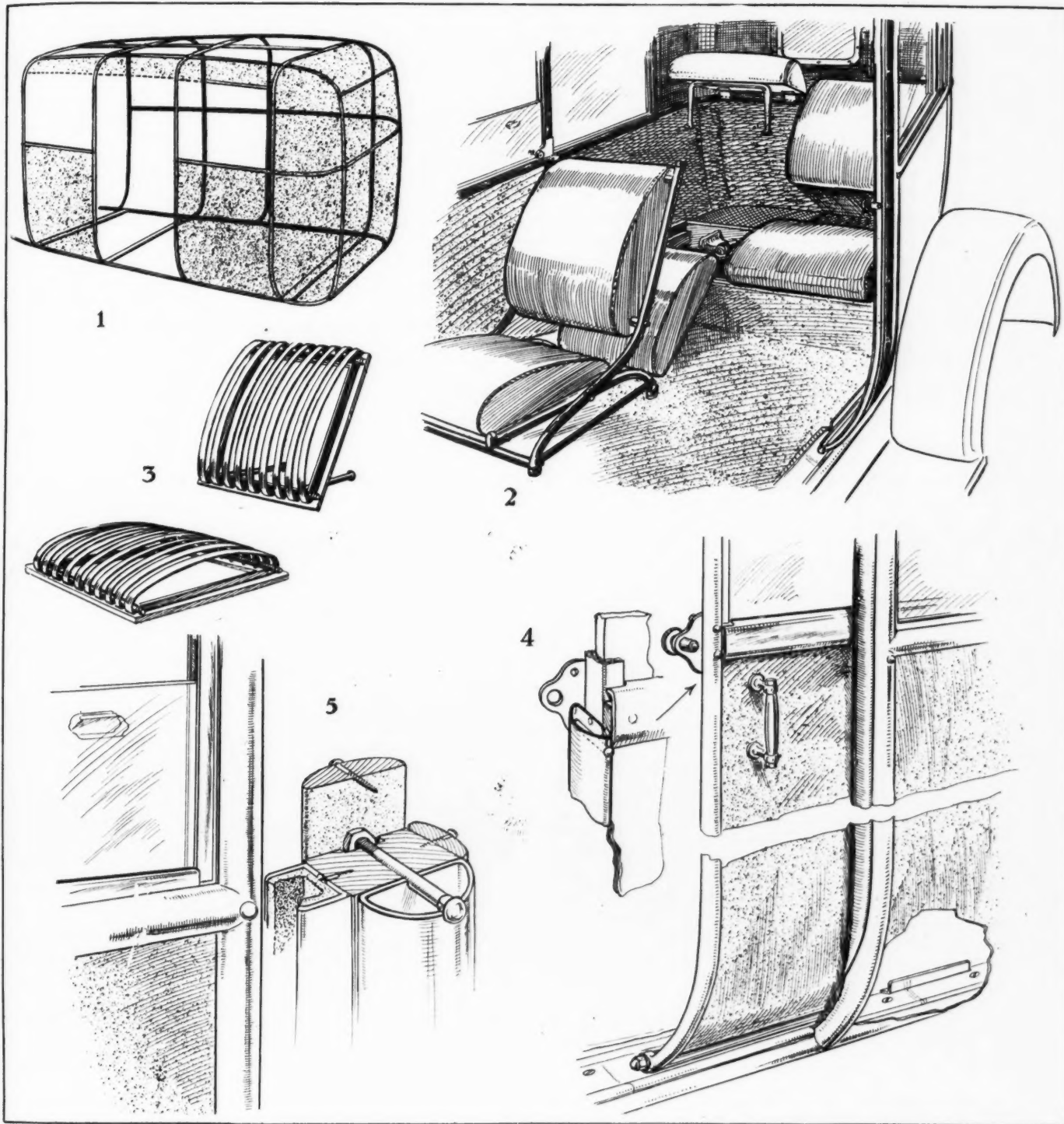
should retain their own shape indefinitely. Rapid wear of the felt from the interior is guarded against by rounding off the sharp top edges of the spring steel.

Fig. 4 shows some details of the door construction. The door is made up of two vertical members of D section tube with the flat sides facing toward one another, and top and bottom members of round tubing. The latter are secured to the side members by tie-rods with a cap-nut at each end, these rods passing through the round tubes and through small lugs welded into the ends of the D tubes. At the elbow line of the door is a cross member of flat steel welded into holes in the flat face of the D tubes. Also secured to the latter by screws are the channels for the frameless drop window, the latter passing down inside the cross bar and lying exposed within the door panel when lowered.

The window channels are felt-lined and of a stock pattern supplied by bodywork hardware makers, and the



Sedan with tubular steel frame



1—Completed body structure with tubing units joined by welding where they abut or pass over one another. 2—Seating arrangements with left front seat omitted. 3—Seat cushions and back rests are identical. Construction consists of wood framing on which are mounted a series of loops of flat spring steel with transverse anchoring and spacing tubes. 4—Details of door construction. 5—Assembly of units found at each side of the windows other than that in the door

same type is used for the other three windows, two of the latter being in the front and middle framing on the right and on the left in front of the door opening. Four windows can thus be lowered and each is secured in any position by two finger screws in small brackets projecting over the edge of the glass from the tubing at each side just above the elbow line; the screws are faced with rubber pads. The rear windows are fixtures.

The central cross member of the door frame is inclosed outside by a plated steel bar with inturned edges, the top edge retaining a rubber packing strip which forms a water seal against the glass. At the top the door hangs

on rollers moving in an inverted lipped-edge channel, which also is a stock fitting used on a much larger scale for the sliding doors of garages and other buildings. At the bottom the door has a short guide plate in front of the opening and a longer one behind, as shown in Fig. 4 through the broken panel. When closed, the door is held in place by the spring plunger shown above the arrow in the sketch.

Fig. 5 illustrates the assembly of units which are found at each side of the windows other than that in the door. The D tubing has a wooden member held to it at top, center and bottom by small bolts and to this are secured

the window channels, and two beadings which are used to give a neater finish but are redundant for all practical purposes. Beadings are also used where the leatherette covering finishes off after passing down over the paneling of the roof edges.

The front or driving screen is a single fixed sheet of glass, it having been considered unnecessary to make this to open in view of the ample ventilation provided by the two windows on each side.

One feature of this body as exhibited which may not meet with approval is the square front, causing a "step" at the back end of the cowl. It would not be impossible to avoid this, however, for the bodies of this type made up to the present have been of a standardized design varying only in size and applied to various makes of chassis without altering the hood and cowl outlines.

Before the scheme would be considered satisfactory from a quantity production standpoint, certain details would require modifying. For one thing, there are too many

small screws passing into tapped holes in the D tubing to hold the aluminum panels in place. Aluminum, of course, has the merit of low weight, but it also has the drawback of being unsuitable for welding to steel tube, whereas steel sheets could be welded. This, however, would take away the feature of panel detachability for easy renewal.

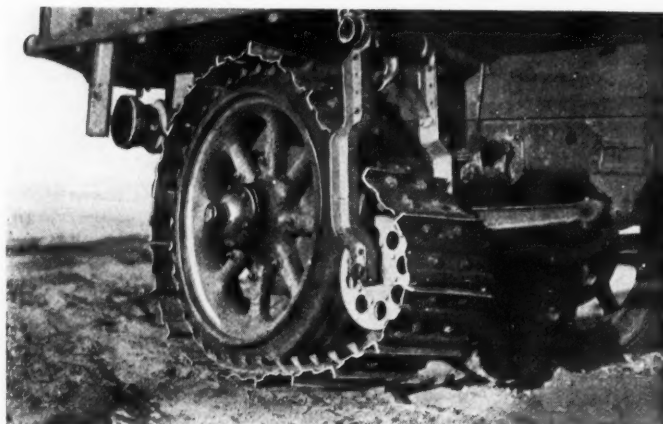
As an alternative, the tubes as well as the panels might be of a light alloy, which would permit of welded joints and reduce the weight still further, without sacrificing rigidity as compared with the present models.

The weight of the models exhibited was given as 330 lb., which compares with 450 lb. for an open body for the same chassis and 600 to 700 lb. for sedan bodies of normal construction and the same size. The makers were offering to fit a body of the pattern and size shown for £100, a figure based on the cost of production when making one body at a time. The cheapest sedan body of normal construction costs at least 50 per cent more.

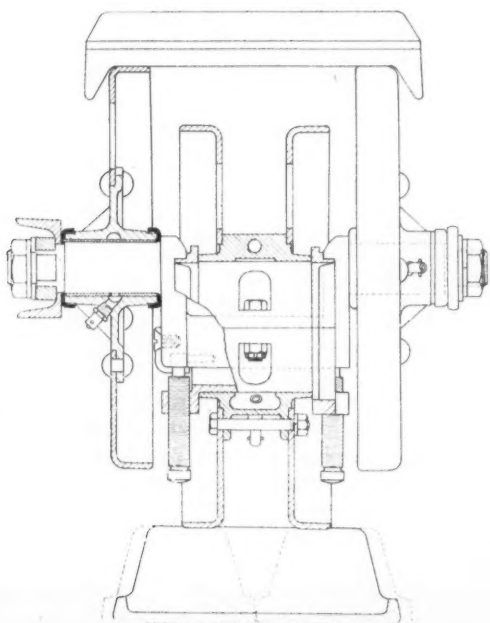
Emergency Traction Device for Motor Trucks

MOTOR trucks in use in country districts often have to operate in places where it is impossible to get sufficient traction with rubber tired wheels and even where the ordinary traction devices such as non-skid chains fail. To meet such conditions, C. F. Ball, who was for a number of years connected with the engineering department of the Holt Mfg. Co., has developed a device which operates on the same principle as the track of the track-laying type of tractor. It is known as the Truk-Trak and is to be placed on the market by an Eastern manufacturer at an early date.

The track is kept in tension in a novel manner. An intermediate idler, mounted adjustably on a crank arm and running against the tire, holds the track idler in the proper position, insuring uniform tension regardless of the spring action. The drive is by friction from the tire. Ordinarily only a very small tension is required. The track idlers are high enough to clear average obstructions, but low enough to help materially on soft ground, by increasing the traction surface and reducing the ground



Close-up view of track on truck wheel



Sectional view of track idler and intermediate idler in contact with tire

pressure per unit of contact surface. As in all track layers, the break of the track over the idler throws a part, at least, of the dirt off the tracks and thus prevents the space between the lugs or grousers from clogging.

When not in use the idlers are swung up under the body and the tracks are mounted on reels. The tracks can be attached or removed in 10 minutes, it is claimed. For hauling out of fields, orchards, etc., the tracks can be left at the roadside, and the loss of time due to the use of the device is then only from 5 to 7 minutes per trip. Special attaching chains are provided for use in cases when the truck is already installed.

For a 2-3 ton truck the attachment weighs 600 lb., and of this weight only the shaft and reels (120 lb.) need to be carried at all times. It is said that a speed of 20 m.p.h. has been attained with the track in position.

AUTOMOTIVE exporters, doing business in Sweden, are being notified by the automotive division of the U. S. Department of Commerce that an exhibition showing the registration of motor vehicles, including passenger cars, trucks and motorcycles, in the various districts of Sweden, during the years 1919, 1920 and 1921, is available for their use.

These exhibits are loaned to the exporters, in the order of the requests received and may be had upon application to the division.

Automotive Consumption Outstanding Feature of 1922 Metal Markets

Kept steel industry on profitable basis. Idea that automobile builders can always afford high prices is disappearing. Pig iron prices fluctuate widely, while aluminum prices rise. More copper consumed than ever before. Lead demand exceeds supply.

By William Crawford Hirsch
Editor, Raw Material

IN point of the tonnage of iron, steel and non-ferrous metals absorbed by the automotive industries, the year 1922 has been a most satisfactory one, especially so to the steel industry. It is obvious that it would have been impossible to increase the country's automotive production by 66 $\frac{2}{3}$ per cent without a corresponding increase in metal consumption. Refinements in automotive construction, however, were responsible for a much greater support in dollars and cents of ferrous and non-ferrous producers by the automotive industries than mere comparison of the dead-weight metal contents of 1922 automotive production with that of preceding years would indicate.

Having had for several years the privilege of contributing to AUTOMOTIVE INDUSTRIES these annual metal market reviews, which are intended to be not so much a retrospect as a compass for the future, the writer has taken special pains to observe the reaction on the metallurgical industries, particularly on the steel industry, of the steadily growing importance of the automotive industry as an outlet for their products. At the very outset of this 1922 review it is gratifying

to note that a decided change took place in the attitude of the metal producers toward automotive demand. If 1922 had brought nothing aside from this in the way of progress, this reformation or conversion of the metal producers would in itself constitute a notable accomplishment because of its future effect on teamwork between the automotive and metallurgical industries. While the steel industry for many years has cooperated in a whole-hearted way with the automotive engineers in efforts to improve the technical merits of steel intended for automotive uses, it would be falsifying history to deny that up to 1922 there was in evidence in the steel market a disposition to minimize the importance of the automotive industries as a steel consuming factor.

Largely responsible for this was an entirely misleading method of statistical compilation in the steel industry, dating from the time when steel was steel. This method is pitifully inadequate in an age in which there is steel that sells at less than 2 cents a pound and other steel

that sells at more than \$1 a pound. The steel statistician, however, still gages the industry's prosperity or adversity by production in terms of tons of steel ingots, leaving out of consideration altogether whether much or little of this ingot output goes into ultimate consumption in the form of structural shapes at 2 cents a pound or as an automotive alloy steel at 9 cents a pound. Because of this statistical generalization and undoubtedly, moreover, because of a desire on the part of the ultra conservative elements in the steel industry to prevent, during the salad days of the passenger car industry, the impression from going forth that the steel industry was dependent for much of

its sustenance upon what was then considered a problematical outlet, it became the vogue to emphasize periodically the relatively small tonnages of iron and steel absorbed by the automotive industries. When automotive mass production became so impressive that the congestion of the highways was on everyone's lips, this phenomenon only served as a clarion call to the steel statisticians to iterate and reiterate that, all this ocular evidence to the contrary notwithstanding, their never-failing figures clearly showed

that the automotive industries consumed only 5 per cent of the country's iron and steel output. Later this figure was revised slightly upward, and it is quite possible that when the tonnage statistics for 1922 have been sufficiently analyzed and mulled over by the tonnage arithmeticians, they may concede to the automotive industries a 10 to 15 per cent share in 1922 iron and steel consumption.

THESE tonnage statistics, however, no longer mean anything to the steel producer who knows that, had it not been for the 1922 automotive demand, dividends, meager as they were in some instances, would have had to be passed instead of declared, and wages of labor, instead of being revised upward as the result of the continuing high cost of living, would have offered no difficult problem, for there would have been precious little use for the work of the laborers. Tonnage statistics as a criterion of the 1922 participation in steel consumption by the automotive indus-

WHAT is the outlook in the metal market for 1923? Will producers be able to furnish the automotive industry all that it wants in the way of metals without delay? What is the price situation?

These are some of the questions that are answered in this practical survey of trends. The story of 1922 is told and to it is added an authoritative prediction of what is likely to happen in 1923.

THE steel industry in the past has not fully recognized the importance of the automotive industry as a consumer of its products. Largely responsible for this was an entirely misleading method of statistical compilation, dating from the time when steel was steel. This method is pitifully inadequate in an age in which there is steel that sells for less than 2 cents a pound and steel that sells for more than \$1 a pound.

Some steel statisticians, however, still gage the prosperity of the steel industry by the production in terms of tons of steel ingots.

tries are doomed to irrelevancy, because from the very start of the year to its finish the automotive industries took the lead as steel buyers and continued to buy consistently after having taken the lead.

It was like a football game. Every time the market lagged, the automotive purchasing agents, who never lost the initiative, their industry being the only one possessed of a reserve force of demand, forced the ball over the goal line of inertia, thus bringing into the market recalcitrant consumers in other lines who were obliged to cover their wants lest automotive consumers preempt the capacity of producers. Time and again the automotive industry's "touchdowns" in the steel market reacted to its own disadvantage in the matter of prices, but the steel mills were kept in operation, and this, moreover, was accomplished without any commitments on the part of the automotive industries beyond the latter's own production schedules.

To a certain extent the automotive industries have themselves to blame for not having long ago been given credit for a much greater consumption of steel and other metals. Current computations of ferrous and non-ferrous metal consumption are largely based on the weight of the various metals in each automotive unit; this is then multiplied by the number of units reported to have been produced in a given year. It is obvious that it takes considerably more steel to make a forging or any other part than is contained in the finished product. The relatively small item of bolts and nuts entails large tonnages of scrap. While this scrap is not waste and re-enters consumption, the difference in value between new and scrap metal is so impressive that utilization of clippings from aluminum sheets for instance, of borings and turnings from high-priced alloy steels, and of drop forge flashings does not begin to make up for the original cost of these materials. It would, therefore, seem but logical to add in all calculations of metal consumption in automotive units to that metal which is actually contained in the finished car or truck the weight of the scrap which could not be avoided in the production of the various parts.

"Automotive Steels"

Another cause of throwing somewhat out of focus actual metal consumption by the automotive industries is the false interpretation placed in some quarters on the term "automotive steels." There are certain alloy steels that are used almost exclusively in the automotive industries. These have come to be known as "automotive steels." Frequently one hears other steel products which in their very character are made for automotive consumption, such as full-finished body sheets, referred to under the general classification of "automotive steels." This has led to the creating of an impression among some writers

who take an interest in both the automotive and steel industries, but are not practically in touch with either, that all the steels used in the automotive industries are earmarked and that no other steels are used for automotive purposes. There are very few steels and steel products that the automotive industries do not use. Tubular steel used in the production and marketing of gasoline, structural steels consumed in the building of garages, and steels used in the building of railroad freight cars for the transportation of passenger motor cars are all consumed by the automotive industries. They may not be automotive steels, but they are most certainly automotive steels because of their utilization in the automotive industries. So are also the high-speed tool steels used in machine tools of which the automotive industries are the largest users. When it comes to computing the automotive industries' relative standing as a steel consumer, it will be well to keep the record straight even though, as stated at the outset, steel producers today are more inclined to concede leadership to them.

Edifying as was the automotive consumption of steel in 1922, conditions surrounding steel production were equally discouraging. As a result, and because of the additional burden imposed by a more or less economic backsliding in general, the steel market's course was deflected from its goal of a gradual reapproachment to pre-war price levels, which program has been in the minds of the leaders of the industry at the year's birth. The coal strike, which sent the price of coke to four times its normal price levels, and the paralyzing of the railroads through the short-lived railroad shopmen's strike, were vicissitudes met by the steel industry with a stout heart.

Price Increase Checked

As always in such crises, steel consumers began to compete with one another for such material as was conveniently available. The major market, however, was kept well in check by the restraint imposed upon it by the leading producers. What slight bulge in steel prices resulted directly from the coal strike, even after it had run beyond the time during which it was ignored because of the surplus fuel on hand, was surprising chiefly because of its modest proportion. It would be faulty analysis to charge the rise in steel prices that took place toward the end of the year's third quarter to account of the coal strike. This would be all the more grievous an error as it would warp one's judgment regarding the outlook for the future which, after all, is more important than past history.

After having bravely swum against the tide of inflation since the debacle that followed the price orgy of the immediate post-armistice period, the leaders of the steel industry began to take stock of actual conditions last summer. Employment managers found it difficult to maintain sufficient labor forces for even 70 per cent operations. Other industries were paying higher wages for lighter work. The existing immigration law made it impossible to replenish the labor supply from that source. Washington, as the election period drew nearer, handed nosegays to the chief steel interest with the intimation that a change from the twelve-hour to the eight-hour day would be considered a most gracious contribution to the cause of political humanitarianism, producers who sought to bring about economies through consolidations met with rebuffs in the headlines and editorials of the press, if not from the Department of Justice; the tariff, not so much directly as indirectly, enhanced the cost of certain raw materials. Why jeopardize the security of the industry by continuing a policy aimed at gradual deflation when other industries were seemingly bent upon maintaining war-time price levels? Why continue to incur the grave risk of labor trouble?

The program of deflation was not discarded, but it was temporarily shelved, to remain so until other commodity markets and industries give evidence of striving for more normal conditions. Wages were advanced. The leading interest offered no opposition to a proportionate rise in selling prices. Although in some of the more basic commodities, like steel bars, the bulge that ensued amounted to as much as 50 per cent, the advance in most of the higher priced, finished products did not exceed 25 per cent from the low of the year and the composite steel price, i.e. a weighted average of the major steel products in proportion to their relative importance did not advance more than to the same extent of 25 per cent. A considerable part of this rise in steel prices has since vanished into thin air and what excess remains at the year's close over the year's lowest levels represents, in fact, nothing more than the actual advance in production costs.

The dual character of the steel market continues. There were times during the year under review when the leading interest permitted the independents to pave the way in price readjustments, but toward the end of the year the Corporation gave unmistakable evidence that its market strategy has lost none of its skill. In November the independents launched prophecies of an early advance in the Corporation's sheet prices, predicated their conviction that this upward change was inevitable not only on the market but on the Corporation's financial necessities. Wide publicity was given to these obviously not altruistic predictions. When the right moment for announcement of its position came, the Corporation made known that the sheet prices of its subsidiary rolling mills remain unchanged.

Sheet Prices Unchanged

This was a keen disappointment to the smaller independents. The tonnage of automotive business overhanging the market was more than satisfactory considering the season. The Corporation's rolling and finishing capacity was considered to be fully committed for the current quarter. The moral effect of adherence by the Corporation to its previous sheet prices, however, was such that the independent rollers had to be satisfied with a modest advance over the Corporation's base price for full-finished automobile sheets of 4.70 cents. Had the Corporation advanced its full-finished base price by \$3 a ton, the smaller rollers would have been justified in establishing a 5.25-cent base for fourth quarter which would have meant a sharp increase in the automotive industries' fourth quarter sheet bill. At the same time the Corporation, by making known a \$36.50 sheet bar price, exerted a restraining influence on the market for the semi-finished sheet material. Although this \$36.50 price was largely nominal in character, governing chiefly the accounts of one of the Corporation's subsidiaries with another, the effect on that part of the sheet bar market which supplies non-integrated rollers with the semi-finished material was not lost, and as a result rolling mills dependent upon outside sources for their sheet bars were enabled to operate without the necessity of advancing prices for their own product. The leading steel producing interest's action with reference to the fourth quarter 1922 sheet market shows clearly that it recognizes the importance of enabling the automotive industries to market their output at prices which will enhance and not impair further growth. The thought that the automotive industries can better afford to pay high prices for steel than any other branch of manufacture, a psychology for which passenger car builders only have themselves to blame because of their "the sky is the limit" buying policy during the post-armistice flurry, is happily going out of fashion, although not yet

LAST summer the steel industry temporarily shelved the program of deflation, because other industries did not seem to be doing their share along that line. The steel industry decided to leave that program on the shelf until such time as other commodity markets and industries gave evidence of striving for more normal conditions.

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completely eradicated from the minds of some of the very small steel producers.

As for the rate at which steel mills operated in 1922, the inadequacy of the present system of statistics again becomes painfully glaring. When the complete returns of tonnage produced in 1922 are in, it will be found to have amounted to approximately 30,000,000 tons, comparable with less than 20,000,000 tons in 1921 and 45,000,000 tons in 1917, the record year for steel production. According to these tonnage figures, the steel industry's health in 1922 was 50 per cent better than in 1921, but there is still room for another 50 per cent improvement without seemingly necessitating capacity enlargement. Ingot capacity is even rated higher than indicated by the 1917 record output, being placed at close to 55,000,000 tons. Rolling mill capacity is estimated at 70 per cent of that of ingot capacity. From all of these figures the layman is apt to gain the impression that the problem of where the steel for their enlarged requirements of the future will come from need give automotive steel consumers no concern.

Automotive purchasing agents learned in 1922 that this is not altogether true. Ingot and rolling mill capacity is obviously more than sufficient to cope with any reasonable expansion in automotive steel demand. Even sheet mill capacity may be adequate in so far as the number of rolls is concerned. The passenger car industry requires, however, much in the way of finished and highly finished sheets. These must undergo a laborious process of finishing after they come from the rolls. There is a woeful deficiency in pickling and finishing capacity of the sheet mills.

Finishing Mills Inadequate

Time and again during 1922 Pittsburgh and Youngstown reports estimated the rate of operations of the sheet mills at 70 per cent when the pickling and finishing capacity of the sheet mills was engaged to the limit of that capacity. Even then the movement of sheets from mills to consumers was clogged because the pickling and finishing departments could not take care of the flow of sheets as they came from the rolls. The automotive industry, now recognized as the leading consumer of steel, requires a great deal of its steel in highly finished and refined form. The over equipment revealed by the tonnage statistics discloses merely reasonable assurance of an adequate supply of raw steel which for many, if not for most purposes is of no use in automotive construction. The time has passed when passenger car builders are satisfied to use billets intended for the rolling of rails as crankshaft material or tool steel for gears. It is the

capacity of pickling and finishing departments, of annealing furnaces, of heat treating departments, of electric steel furnaces, in short of those mechanical improvements which the automotive industries forced upon the steel industry that is of paramount importance in determining whether the steel industry is in a position to take care of automotive requirements of the future. Abundance of iron ores and the necessary mechanism to convert it into raw steel is conceded a priori. Sheet mills may be working at only 70 per cent of their rolling capacity and yet be unable to book additional orders for finished sheets because their finishing capacity is much lower than their rolling capacity. This condition was at times so conspicuous in 1922 that one is tempted to assert that the steel

IT has been an open secret for some time that a large copper-producing interest has been seeking to enter the aluminum industry through the utilization of Utah alunite deposits.

It is said that considerable metallurgical difficulties were encountered, but these alunite deposits of the Mountain States containing a hydrous sulphate of potassium and aluminum, and very rich in the latter, will eventually form the basis of new sources of supply for the aluminum industry.

mills enjoyed as much business from the automotive industries as their equipment permitted them to handle.

Little need be said regarding the market for the various specialties in which the automotive consumer is interested. The strip steel market followed the lines of the general price movement. Frequently during the year reports were current that the strip mills were working only at half their capacity. This, however, was due to a lack of demand from other than the automotive industries. They later took more than their full quota of the output of cold-rolled and hot-rolled strip steel. Makers of cold-finished bars enjoyed large sales to automotive consumers, but experienced considerable trouble in securing adequate supplies of hot-rolled bars at prices making remunerative the process of conversion.

Bolt and Nut Demand Large

Automotive demand for such products as bolts and nuts was consistently large throughout the year. One large consolidation was reported in that industry toward the end of the year. Reports became current in the middle of December that prices would be revised slightly downward and as a result consumers assumed a waiting attitude, but shortly before the year's close they came back into the market.

Developments in the alloy steel market in 1922 were not of a spectacular character. The price movement in the various alloying metals, such as nickel, and in alloying minerals, such as chrome, as well as in the various ferro-alloys was narrow, and of little influence on the price of finished alloy steels. Makers of special alloy steels for automotive use encountered little difficulty in getting together with consumers on prices, and the industry enjoyed on the whole a moderate prosperity. Technically there were no startling innovations; the year was rather given over to perfecting in mass production metallurgical processes evolved in previous years. The use of molybdenum steels continues to grow. Considerably more attention is also being paid to the use of chromium, not only in combination with nickel, but also by itself. There is

no doubt that chromium is coming to be more and more recognized as the most available agent for retarding corrosion. In passing it may be mentioned that efforts to perfect a process for plating with chromium are a recent development.

Rise in Pig Iron Prices

Pig Iron.—The outstanding feature of the 1922 pig-iron market was the sensational rise in prices which ensued following settlement of the coal strike. In February No. 2 Foundry sold at \$19, valley; in August \$35 had become the quotation. Three months later the market had receded to \$25. A state of affairs which permits what is perhaps the world's most essential raw material to fluctuate thus violently in the course of less than a year challenges the consumer's attention and thoughtfulness. There were, of course, valid reasons for a sharp advance in pig iron prices when the Connellsville coke market leaped to four times its normal levels. Moreover, it was assumed in July that the country suffered from a deficiency of 25,000,000 tons of pig iron as the result of underproduction during the preceding year and the first half of the current year. On August 1, there were only 29 furnaces in blast, on December 1, 242. Having said all this by way of citing the principal factors that justified so impressive an advance, it may be very properly asked what would have been the feelings of an automotive foundry proprietor who, mistaking the 1922 flurry in the pig-iron market for the beginning of a prolonged period of genuine famine prices, would have covered his forward requirements, and who about Christmas time would have had the pleasure to behold in his yard the tonnage remaining from that \$35 purchase now worth \$9 per ton less. All merchandising and manufacturing entails a certain amount of risk, but when the market for a primary staple is so mercurial that in the course of a few weeks it advances 80 per cent and in the course of another few weeks it declines 30 per cent, the natural result is certain to be that in the long run buyers will become unduly timid and buy at retail rather than run the risk of ruinous depreciation. It so happened that automotive foundries did not buy a pound more iron than they absolutely needed for immediate requirements while the market ranged between \$30 and \$35. When the base price receded to \$25, they replenished their sadly depleted reserves to a moderate extent. Valuable aid in restoring the domestic pig iron market to sane levels was rendered by the foreign blast furnaces which during the height of the flurry sent heavy cargoes to the United States.

Tariff Helps Aluminum

Aluminum.—Enactment of the Fordney-McCumber tariff bill into law, providing as it does for a 5 cents per pound duty on aluminum ingots and of 9 cents per pound duty on aluminum sheets, was the pivotal event of the year in the aluminum market. Previous to the coming of these new rates of duty, the importers of European metal held the whiphand in the market, although the sole domestic producer of virgin metal contested with them every inch of ground, and successfully so in most cases of difficult specifications and when consumers were exacting in the matter of purity and quality. Importers had made their last will and testament when it became certain that the aluminum schedule would be retained in the new tariff and that the latter would receive the President's signature. The best they hoped for was that the advance which most of them expected to materialize without delay would enable them to liquidate their warehouse holdings at a profit and then they would withdraw from the field. Events, however, shaped themselves somewhat different from their expectations. By two successive advances the

domestic producer revised his ingot prices upward to the extent of 4 to 5 cents per pound. As a result the importers had no difficulty to compete with the domestic producer in the ingot market. In fact, American 1923 aluminum ingot requirements have been to a large extent covered by orders placed with importers in November. The situation with reference to rolled aluminum products, especially sheets, was somewhat different from that surrounding ingots. The 9 cents per pound duty on this fabricated material enables the domestic producer to control the market more closely and it has become a commonly accepted statement in the market that the domestic producer's program aims at selling as much of his output as possible in highly finished form, i.e. sheets, rods, wire, etc. In that policy the domestic producer is following best practice, as applied today by the leading copper interest. Some aluminum sheets, however, are apparently being rolled in this country from imported metal, the rolling being done by zinc and other rollers. That the domestic producer is keenly alive to the fact that any marked increase in aluminum consumption must come from the automotive field is best illustrated by the fact that a certain passenger motor car containing a large amount of aluminum parts is being sold in Brazil from the offices of the South American subsidiary of the American aluminum manufacturer.

New Extraction Method

Recent reports from Germany are to the effect that a process has been patented permitting a more economical extraction of aluminum from bauxite and kindred alumina-containing earths. If this is substantiated, it would revolutionize the aluminum industry. It has been an open secret for some time that a large copper-producing interest has been seeking to enter the aluminum industry through the utilization of Utah alunite deposits. It is said that considerable metallurgical difficulties were encountered, but these alunite deposits of the Mountain States containing a hydrous sulphate of potassium and aluminum, and very rich in the latter, will eventually form the basis of new sources of supply for the aluminum industry.

Recent gossip has been to the effect that the American producer has acquired an interest in the Norwegian Aluminum Company. This may or may not be true, but a more cordial understanding among the aluminum producers of the world, a sort of a gentlemen's agreement, would not be at all surprising. Pre-war precedent for such an understanding is not wanting. In fact, there is in existence one aluminum enterprise which owes its establishment to a desire to impress certain European producers with the fact that it is a poor game that two cannot play at, and that if they insist upon dumping cheap metal abroad, cheap metal can be dumped into their natural and legitimate bailiwick. The future of the aluminum situation depends, therefore, to a large extent upon international relations between the producers. The outlook is that they will be rather more amicable in the future and not as highly competitive as they have been in the past.

Copper.—The automotive industries today play a far more important rôle in the copper and brass market than they did a year ago. Take a typical mill, making a specialty of automotive supplies, such as the Detroit Copper and Brass Rolling Mills which furnishes much of the brass used in the Ford car, including the brass for radiators, the output of which is 6000 per day. This mill consumes approximately 6,000,000 lb. of metal a month, the greater part of this tonnage being copper. In December a copper wire mill representative stated that his

company was receiving 6,000,000 lb. of wire business every month from two Detroit passenger motor car manufacturers and other orders from the automotive industry for smaller amounts of wire. Magneto-coil makers and manufacturers of ignition systems were buying more than liberally in the wire market during the year's last quarter. It is astounding to note the tremendous efforts which the copper and brass industry is making to increase the consumption of its products in the building industry which, according to President R. L. Agassiz of the Copper and Brass Research Association, consumes only 75,000 tons a year, although its potential consumption is 300,000 tons a year, while the automotive consumption of copper and brass, actually and potentially much greater, fails to come in for the attention which it deserves. A conservative estimate of copper and brass consumption by the automotive industries in 1922 would reveal a total of approximately 100,000 tons.

The copper market suffered throughout the year from the belated after effects of the tremendous war surplus of virgin and scrap metal. As an outlet for American copper, export channels were more or less clogged because of Europe's financial condition, especially so because of the collapse of the mark in Germany, ordinarily America's best copper customer. The close of the year finds the market in better condition than it has been at any time during the year, with producers quoting electrolytic at from 14½ cents per pound upward.

Further expansion by the leading copper market interest in the direction of upbuilding its wrought copper and brass products business is noted. The reported sale of the Chile Copper Company to Anaconda will, if consummated, give the latter an additional supply of the cheapest possible copper for conversion in the American brass mills, which are to be added to by the erection of additional rolling mill units near the Great Falls (Montana) refineries. Rumors of other mergers were current

CONSIDERING general conditions present steel prices are on the whole fair. The steel buyers, with the purchasing agents of the automotive industries in the lead, have it in their power to keep present conditions stabilized until such time when general world conditions will permit of a resumption of the program of deflation.

There are bound to be price fluctuations in 1923 as there have been in every year since markets have existed. On the whole, however, the outlook is for considerable stability in the steel market.

at the end of the year, Calumet & Hecla being the moving factor in a consolidation of Lake copper producers and important rolling mill interests.

Tin Prices Advance

Tin.—In August tin sold at 32½ cents for Straits. In October the price rose to 37½ cents, thanks to the maneuvers of an enterprising London speculator who, for a few days bought all the Straits tin in sight. The year's close finds the market at about 38¾ cents, comparable with the year's low of 28¾ cents. The 5 cents per pound advance engineered by the London bull referred to costs American tin consumers, who require about 45,000 tons of imported tin a year, approximately

\$5,000,000. When it is considered that the Ford plants consume about 500 tons of tin per month in bearing metals, etc., and other automotive producers another 600 tons, it will be readily seen that the automotive industries will pay a good share of this advance.

Lead.—The supply of lead throughout the year proved smaller than the consumption and reserve stocks in the hands of producers have been completely eliminated. The automotive industries which consumed between 8000 and 9000 tons of lead in 1922, chiefly in batteries and rubber tires, suffered keenly at times from the nip-and-tuck state of the supply and demand. The market started the year at 4.70 cents, New York, and closed at 7.25 cents, the trend being almost steadily in an upward direction. Lead is one of the few metals of which we have an insufficient world supply at the present time. Run-away conditions in the market were frequently prevented only by the astute and timely generalship of the leading interest.

Boom Year for Zinc

Zinc.—Zinc producers changed in 1922 from sackcloth to royal purple. Their metal sold at the year's opening at 4.85 cents, East St. Louis, or perhaps it would be more correct to say that it was quoted at that level without sales of any appreciable tonnage being quoted. The year's close finds the zinc market looking back upon a period of at least four months' greater prosperity than the zinc industry has enjoyed in many years and the price at approximately 7 cents, an advance for the year of about 45 per cent.

Nickel.—While the market movement of this metal was devoid of interest, the fact that the industry is once more working at full speed after several years of lethargy deserves mention, this all the more so because the consumption of nickel by the automotive industries in nickel steels and nickel plated parts was perhaps the greatest contributing factor toward bringing about a revival of activity in this metal.

Magnesium.—This metal so highly important in the construction of airplanes and to a certain extent, especially as an alloy, in the manufacture of passenger motor cars, is now being manufactured commercially by at least two American producers. Some magnesium products are also being imported from Germany which still seems to have a stranglehold on intensive utilization of magnesium. One of the American producers surrounds his operations with considerable secrecy. The other appears to confine his activities to the production of only a few parts. Marketwise the status of the metal is shrouded in mystery.

What Has 1923 in Store for Metal Buyers?

Leaders of the steel industry are genuinely optimistic regarding the outlook for 1923. This implies that they are confident of an increased demand for the products of their mills. It does not imply that they hope or are striving for higher prices. In fact, the thoughtful men in the steel industry are bending every effort to increase profits by instituting operating economies and not by an enhancement of selling prices which might jeopardize the much hoped-for growth in consumption. Because of the artificial labor conditions and the general economic trend the steel industry is not in a position to reduce prices to any extent, even though such reduction might prove a great stimulant to consumption. On the other hand, the industry's best minds are resolutely set against permitting further inflation which would only add to the circumference of the vicious circle for higher selling prices would presto be reflected in still higher wage scales. Considering general conditions present steel

prices are on the whole fair. The steel buyers, with the purchasing agents of the automotive industries in the lead, have it in their power to keep present conditions stabilized until such time when general world conditions will permit of a resumption of the program of deflation. There are bound to be price fluctuations in 1923 as there have been in every year since markets have existed. On the whole, however, the outlook is for considerable stability in the steel market.

A more normal rate of production is likely to be attained by the pig iron industry in 1923, and this should eliminate from the range of possibilities another year of so startling ups and downs as automotive foundries witnessed in the price of their principal raw material in 1922.

In the non-ferrous markets conditions seem to favor a gradual appreciation in the value of copper. The law of compensation eventually overcomes all obstacles. The copper market first came upon evil days in October, 1920, and they have continued more or less evil since. It looks now as though the market had definitely turned the corner.

The future of the aluminum market is problematical. It will depend largely upon the extent to which foreign producers will be willing to compete with the domestic interest. It must be borne in mind, however, that during the five-year period which preceded the outbreak of the European war, from 1909 to 1913, average yearly prices were practically the same as those which prevailed toward the closing period of 1922. So far, therefore, the high rate of duty recently imposed may be said to have been absorbed by the sellers. It would seem that those who look for cheaper aluminum have the weight of the statistical evidence of the past against them.

Aluminum Prices Have High Limit

Those who fear the coming of much higher prices will do well to bear in mind that there is a very decided limit to what aluminum consumers in many lines of industry can pay for their metal and if the price exceeds this limit they must substitute other and cheaper materials. The aluminum industry is hardly likely to abandon any of its consuming outlets by overstepping these price limits.

The tin market, as the history of the tin corner of the London Metal Exchange in 1922 showed, is in the keeping of the speculative element, but here, too, it will be well to bear in mind price conditions during the pre-war period. In 1910 tin sold at very close to the 1922 end-of-the-year prices, in 1911 the average price was 42½ cents and in 1912 it was 46½ cents, or 10 to 20 per cent higher than the 1922 closing levels.

Production of both lead and zinc is likely to be greatly stimulated in 1923 and the market is certain to respond to some extent to this improvement in the supply, although the old-time 4 and 5-cent prices for lead and zinc may not recur for some time.

Market Conditions a Good Compass

All in all, metal market conditions in 1922 furnish a better compass to the automotive purchasing agent for a straight course in 1923 than was the case at the close of 1920 and 1921 with reference to their respective successors.

Of course, if a recurrence of the coal miners' strike ensues in April, 1923, a possibility which the steel industry considered during the last few weeks of December as not too remote for precautionary measures, all calculations and conjectures may be upset for a time, but such an incident, it will be well to bear in mind, would only interrupt and not nullify the market trend outlined.

Four-Bearing Knight Six Powers New R. & V. Model

Features include a new and exceedingly rigid frame and long springs the rear ends of which are carried on swivels with inclined fore and aft axes intended to minimize frame twist. V-type radiator abandoned. Adjustable steering gear provided.

AN entirely new car designated as Model H has been brought out by the R. & V. Motor Co. It is fitted with a six-cylinder Knight engine and while it is of the same size as the one which the company has been building for three years, important improvements have been made, chief of which is the installation of a four bearing instead of a three bearing crankshaft.

The new engine develops considerably more power and is capable of higher sustained speeds than its predecessor. The company states that in tests this engine has attained a speed of 4350 r.p.m. The chief reasons for greater power and fuel economy lie in the improved intake manifold and fuel economizer. These are entirely a development of the R. & V. company. Better engine performance also has been obtained by the use of light weight iron pistons and lighter connecting rods. To improve the wearing qualities of the eccentric shaft this part is now made of chrome nickel steel.

Other improvements have been made in the gearset and single dry plate clutch. The control levers have been more conveniently located. The V-type radiator which has featured all R. & V. Knight and Moline Knight cars since 1914 has been replaced by a flat front radiator, the shell of which is nickel plated. The radiator is of better construction and its shape permits of the installation of automatically controlled shutters. Cooling is further improved by adoption of a two-blade propeller type fan. There is also a better arrangement of the water jackets in the engine itself.

Externally the new car has little resemblance to the former model. The lines of the car are better than those of the former six. There is also improvement in both appearance and sturdiness of construction in the sheet metal parts. The windshield is of a built-in type, having two integrally mounted glass shutters on the side, which serve both as ventilators and dust shields. The top is of the permanent type, but is no heavier than the ordinary cape top. The winter enclosure for the car is so well worked out that the open cars are very comfortable cold weather vehicles.

Among the detail refinements is the mounting of the steering gear, which is so arranged that the position of the wheel can be changed to suit the driver's convenience. Ample space for light tools has been provided in a leather lined pocket in the left front door and this pocket is fitted with a lock. Provision for carrying the heavier tools, such as the jack, tire chains, etc., is made in a box under the front seat. The gasoline tank is of very large capacity and is equipped with a Mercury sealed gage integral with which is a valve controlling a reserve supply of fuel.

Electrical equipment has been improved and the wiring has been made much more accessible. The 153-ampere hour six-volt battery is placed under the left front seat.

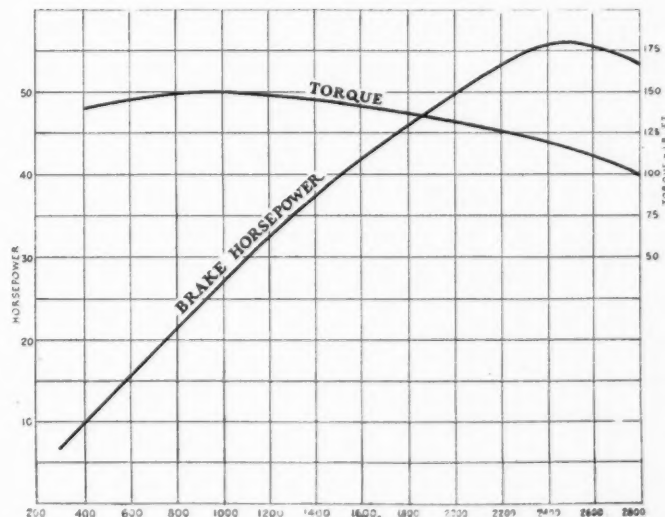
One of the rather unusual features of the R. & V.

Knight six is its spring suspension, which provides 103 inches of springs on each side of the car, the wheelbase of which is 124 inches. The front spring is 42 in. long and the rear 61 in. The excellent riding qualities of the car are due in a large measure to the method of attaching the springs to the frame. The rear ends of both front and rear springs are mounted in swivels with inclined fore and aft axes. This arrangement permits of some transverse motion and tends to minimize twisting strains on the frame member.

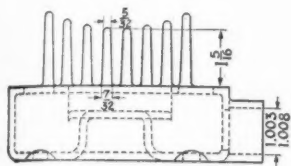
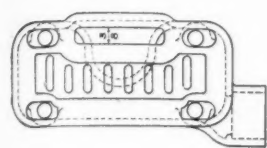
The five bodies on Model H chassis include 5 and 7-passenger phaetons at \$2,850 and \$2,900 respectively; a 4-passenger sport, 5-passenger club sedan at \$3,500 and 7-passenger sedan at \$3,700. All open models are upholstered in leather, while cloth is used for the closed jobs. The open cars are finished in dark blue, while the club sedan is finished in pelican gray with black trimming. Equipment in addition to the usual line includes a front bumper, snubbers, cigar lighter, primer, tire chains, etc.

The engine is of 3½ in. bore by 4½ in. stroke, giving an N. A. C. C. rating of 29.4 hp., and a piston displacement of 259.8 cu. in. Torque and power curves of the Model H engine are given in an accompanying cut. The compression pressure is 80 lb.

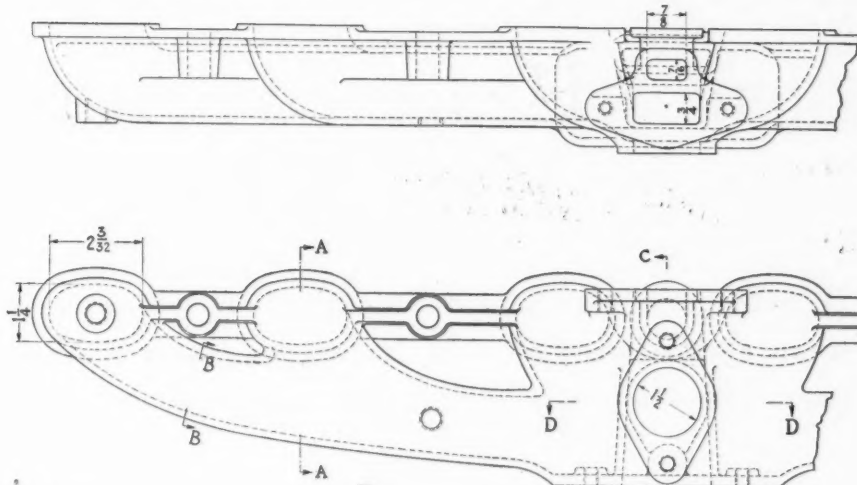
A three point suspension is employed for the engine. A



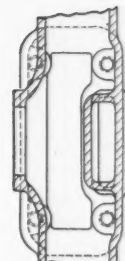
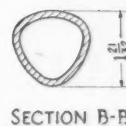
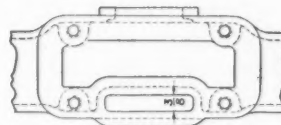
Power and torque curves of the Model H,
R. & V. Six



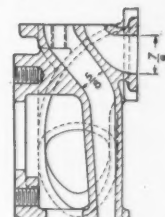
Intake manifold and exhaust heated vaporizer used on the latest R. & V. Six



SECTION A-A



SECTION D-D



SECTION C-C

separate head is used for each cylinder and there is one junk ring and one head ring. Cylinder bores are completely surrounded by water, which is circulated by thermosyphonic action, the total water capacity being $7\frac{1}{2}$ gallons. The cylinder block is cast iron, while the crankcase is of aluminum thoroughly ribbed for strength and stiffness.

The sleeves are made of fine grain grey iron heat treated and seasoned before machining to eliminate warping. The outer and inner sleeves are $9\frac{37}{64}$ and $11\frac{1}{4}$ in. long respectively. The sleeve travel per revolution is one-ninth that of the piston. The intake port opening is $\frac{7}{16}$ by $3\frac{1}{8}$ in., while that of the exhaust is $\frac{1}{2}$ by $2\frac{3}{8}$. A special composition bronze is used for the sleeve rods in order to give strength and good bearing surfaces on the crankpins of the eccentric shaft. A Whitney silent chain $\frac{3}{8}$ in. thick and $1\frac{1}{4}$ in. wide is used to drive the eccentric shaft, while the accessory drive chain is $\frac{3}{4}$ in. wide.

A very stiff crankshaft forged from 1045 S.A.E. steel is used. It is put in dynamic balance together with the flywheel and clutch on a sensitive balancing machine. The sizes of the main bearings are as follows: Front, $2\frac{1}{4}$ in. diam. x $2\frac{1}{2}$ in. long; front center, $2\frac{5}{16}$ x $2\frac{5}{16}$ in.; rear center, $2\frac{3}{8}$ x $2\frac{7}{32}$ in.; rear, $2\frac{7}{16}$ x 3 in.

The nickel steel connecting rods are $10\frac{3}{4}$ in. long and have a crank bearing $2\frac{3}{8}$ in. diam. by 2 in. long. The dimensions of the eccentric shaft bearings are as follows: $1\frac{5}{8}$ in. diam. x 2 in. long, $2\frac{1}{16}$ in. x $2\frac{3}{4}$ in. long, $2\frac{1}{16}$ in. x $2\frac{3}{4}$ in. long and $2\frac{1}{16}$ x $2\frac{7}{8}$ in. long.

The Double-Seal pistons are fitted with two Double-Seal rings, one set against compression and the other against suction. The piston pin is 1 in. in diameter.

Pressure Oiling System

Oil is supplied under pressure to the main bearings, crank bearings and eccentric bearings from a gear pump located in the sump. A supply of oil is also delivered to the timing chains in the front end. One and one-half gallons of oil per minute are delivered by the pump when the engine is running at a speed of 1000 r.p.m. The oil reservoir holds 10 qts. of lubricant.

Vaporization of the fuel is taken care of by a Stromberg $1\frac{1}{4}$ in. horizontal outlet carbureter. Working in conjunction with an exterior intake manifold which is heated at the lower central portion by a hotspot. A small flexible

tube carries the exhaust gases from this hotspot to the rear of the car.

Mounted in unit with the engine is a Brown-Lipe Model 30A multiple disk clutch and gearset. The drive to the Timken rear axle is taken through a Spicer shaft and joint. The ratios in the gearset are: High, direct; second, 1.68 to 1; low, 3.33 to 1; reverse, 4.33 to 1. Bevel gears in axle, 5.4 to 1. Both the drive and torque are taken through the springs. The front axle is also a Timken product.

More Rigid Frame

The frame in this car is a good example of the modern tendency toward the adoption of more rigid construction in this element. The side rails in this case are made from $\frac{5}{32}$ in. stock, are 7 in. deep and have $2\frac{1}{4}$ in. flanges. To resist twisting stresses in the frame three heavily gusseted cross members and a tube at each end are riveted to the side rails.

A Jacox Model L-2A-17 worm and nut type steering gear is used and is so arranged that, by loosening the bolts which hold the steering gear bracket to the instrument board the entire steering gear can be moved up or down to suit the convenience of the driver. A sliding trim plate on the floor board accommodates itself to the new position when this adjustment is made.

The electrical equipment includes an Auto-Lite two-unit six-volt single-wire system. The starting motor has a gear reduction of 11 to 1 with 21 lb. ft. torque. There is a combination ignition and light control switch so arranged as to allow the taillight to burn alone by turning the switch between the bright and dim position. A 7-point fuse and junction block is placed on the engine side of the dash. The body can be easily detached from the chassis, inasmuch as there is a ready means provided for breaking the electrical connection at the fuse block.

THE prohibition on importation of foreign-made motorcycles into Germany, in addition to adverse exchange conditions, is an insurmountable obstacle which American manufacturers are experiencing at the present time, says Consul K. Huddle, in a report to the Automotive Division of the Department of Commerce. German-made motorcycles are retailing for approximately 300,000 marks.

Anathemas Heaped on Automobiles

by Mark Sullivan

He holds them responsible for spread of radicalism. Says pedestrians always have first right in streets. Thinks that "railroads carry cross on which they are crucified" to aid trucks.

AVITRIOLIC attack on the automotive industry, contributed to the January number of *The World's Work* by Mark Sullivan, is important chiefly because of the character of the publication and the author's reputation as a commentator on political affairs. The purpose of the denunciation is defeated by its lack of constraint.

No one can find fault with Sullivan's text, which is that "the reckless driver must go." He should be driven off the highways and the automotive industry should aid energetically in the driving. Fines are not effective in dealing with this type of motorist. Conviction, after a fair trial, should carry a jail sentence with it as well as permanent forfeiture of license.

Agitation for more stringent examinations of applicants for drivers' licenses will not help the situation. The most reckless drivers often are the most skillful. It frequently is a case of familiarity breeding contempt. When a man in a motor car is reckless there is only one effective remedy. That is to take his car away from him and not let him have another.

When a writer proceeds, however, as Sullivan does, upon the theory that no one except the pedestrian has any real rights in the public streets and highways, he makes himself ridiculous. He seems to hold the theory that the speed limit for all vehicles should be the three or four miles an hour of the average pedestrian. For example, he contends that the child on roller skates has street rights prior to the "pleasure automobile."

The first paragraph of Sullivan's article indicates its general character.

"If it were asked," he writes, "what one thing, more than any other, justifies the mood of angry sullenness which is characteristic of America just now, and which expressed itself so violently in the recent election, a reasonable answer might readily say it is resentment against the failure on the part of those responsible, to prevent the killing of thousands of children, the wounding of thousands more and the intimidating of everybody by the automobile."

Motor Vehicle Breeds Radicalism

Attempting to stigmatize the motor vehicle as a breeder of radicalism is a hard job. It long ago ceased to be a toy of the rich. There are in use today in the United States between 11,500,000 and 12,000,000 cars and trucks. It is conservative to say that an average of four persons uses each of these vehicles which would make a total of between 46,000,000 and 48,000,000. There are millions more who own no cars of their own but who are frequent riders in taxicabs or buses.

This takes in approximately half the population of the

United States. This half may have driven the other half rabid, but we doubt it.

Sullivan remarks that "the maker and dealer want the sort of regulation that will make it possible to have more automobiles on the streets," but that "the individual automobile driver would prefer fewer" for "the number already on the streets is an embarrassment to him." We'll admit the embarrassment but we're constrained to wonder what process would be employed in separating the sheep from the goats in determining who should and who should not be permitted to have cars.

The kind of regulation for which he argues would mean a practical cessation of business.

"The only person whose right on the streets should be qualified is not the walker," he says, "but the person who goes upon the streets with an immense mechanism of iron, with the power of forty horses and a speed that means danger to every user of the streets. Any community which permits itself to be driven off the streets, or any part of them, by the entrenched power of the small number of persons who have a material interest in seizing the streets for the automobiles—any such community has reached a degree of supineness about its rights that is pretty menacing in a society organized on the theory of upholding the rights of the individual."

Rights of Pedestrians

In other words, when the rights of an individual who doesn't own a motor car come into conflict with the rights of another individual who does, the owner of the car is automatically wrong. There are two classes of people in the country, habitual pedestrians and habitual motorists, and the voting power should be vested exclusively in the pedestrian.

Sullivan goes out of his way to dilate upon the sinister power of the "entrenched" motor vehicle manufacturers and dealers, their "subtle" propaganda in inventing such terms as "jay-walker" and "road mope" and their brutal determination to maintain or raise speed limits so there will be room in the highways for more cars and trucks. These observations scarcely warrant serious consideration.

The following paragraphs, found in the middle of the article, are not the least interesting from the viewpoint of the automotive industry:

"In point of fact, the automobile has not begun to bear the taxation that it should. The interests concerned have been very energetic and successful in opposing any addition to the cost of automobiles.

"There is no man more proper to contribute heavily to the expenses of society than the one who consumes the power of twenty to forty horses to carry his single

person down town in the morning. In most American cities, if a man keeps his automobile at night in a hired garage, the rental charge is anywhere from \$200 to \$400 a year. But, thanks to the vigilance of the interests concerned, he is permitted to occupy the public's streets—in motion or parked—for the daylight half, or more, of the twenty-four hours with no greater charge than a nominal \$5 or \$10 a year.

"The failure to tax motor trucks and motor buses adequately has been a public scandal (although in some States we are just getting to the point of recognizing that the automobile ought to pay at least the cost of the building and upkeep of roads). We have seen the public generally taxed and bonds issued to pay the cost of building improved roads. Then we have seen great five- and ten-ton trucks come roaring along, tearing up the roads in less than a tenth of the period of the life of the bonds.

"The way the motor truck has succeeded in getting itself subsidized as compared with the railroads is not

only an economic mistake but a moral crime. When you ask a railroad what a given shipment of freight will cost you, the railroad must make a price which will not only meet the expense of that particular service, but will also provide for the upkeep of the roadbed. But the motor truck can underbid by naming a price for the service alone. The cost of building and maintaining the roadbed has been paid out of general taxation. In that general taxation the railroad has provided a large share.

"We have taxed the railroads and used the money to subsidize competition against them. We have made the railroads carry the cross on which they are crucified. The railroads have been under a great prejudice in this country; but no community can commit such an economic crime with safety, or such a moral crime with decency."

These observations seem to have rather a familiar ring.

Heaven pity the poor, helpless, defenseless, friendless railroads!
J. D.

New Cincinnati Press Brake Has All Steel Construction

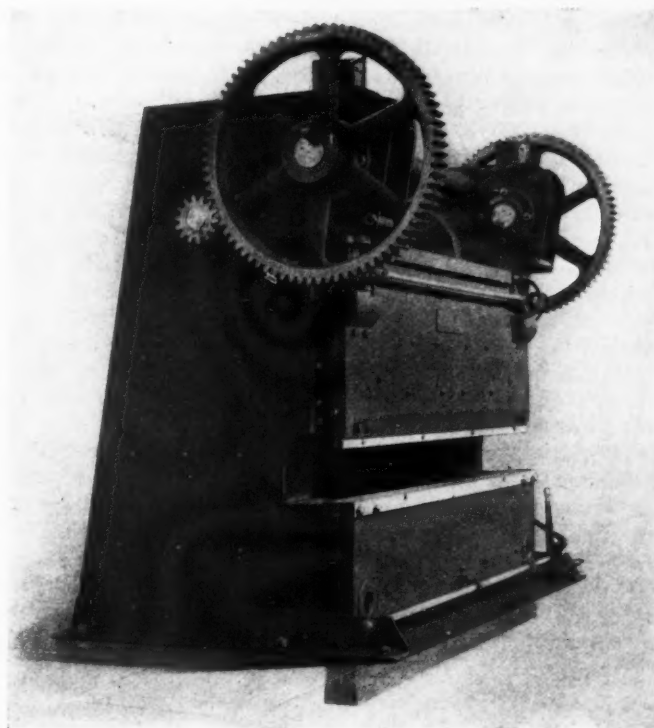
A PRESS brake in which the frame and other major parts are made of steel plates welded together has been developed by the Cincinnati Shaper Co. Usually these parts are made of iron castings and for a given capacity the machines must naturally be a great deal heavier. Another advantage claimed for this construction is that deflections under working strains are reduced and the work therefore comes closer to the true size or shape. The parts are made from heavy rolled steel electrically welded into a single unit. Where bolts are used to draw the plates into place they are welded to the plates, so they become an integral part of the member with no chance of working loose.

A feature of the design of the machine is the open throat or gap, which eliminates limitations on the width of the material which can be handled. Most bends are made near the edge of the plate and hence the full width of the die-holding surface can be utilized. Even when it is desirable to pass the work through the housing, a clear space in front of the machine is an advantage.

Turning to the construction of the working parts, the flywheel, clutch, reduction gears, worm and worm wheel ram adjusting device run in a bath of oil. All main driving bearings are of bronze. The flywheel is mounted on high duty ball bearings and similar bearings are used in the ram adjustment. All gears and pinions are of steel and accurately cut. The ram is gibbed both endways and sideways. The eccentrics are of high carbon steel and forged integral with their shafts. A splined trip shaft runs the full length of the machine carrying an adjustable treadle which enables the operator to engage the clutch from the most convenient position. The clutch is of the multiple disk type.

These brakes are made in sizes ranging in ram pressure from 80 to 600 tons, for working material from No. 10 gage to $\frac{3}{4}$ in. in thickness; the widths between housings vary from $6\frac{1}{2}$ to $14\frac{1}{2}$ ft. and the weights from 9 to 60 tons.

A COMPILATION of the cost of motor transportation and the development of better highways in China has just been completed by the Chinese Government Bureau



Cincinnati all-steel press brake

of Economic Information, and forwarded to the automotive division of the United States Department of Commerce.

The figures show that the cost of operation of a motor truck in China is 5.6 gold a ton-mile, or \$14.10 a day, covering all expenses and investments on a five-ton truck covering 50 miles a day, or 250 ton-miles.

The costs were estimated on a basis of a truck costing \$4,637 to the consumer in China. Depreciation charges were based on a 5-year service of 50,000 miles; operation costs were based on 50 miles a day with a 5-ton load; fixed costs based on 300 days a year and tires being estimated on 10,000 miles service.

Adjusting Carbureters by Exhaust Gas Analysis

Maximum of carbon dioxide in exhaust gas 13.5 per cent, extensive research indicates. Government develops practical testing methods. Application of methods effects fuel economy.

WHEN gasoline and air are mixed in the theoretically correct proportion for complete combustion, and are then burned, the exhaust gases should consist of carbon dioxide, water vapor and nitrogen in certain proportions. In practice, however, even though the fuel mixture may be correctly proportioned, it is never completely burned, for the reason that the mixture is not absolutely homogeneous, and in addition to the gases mentioned there will be present in the exhaust small quantities of hydrogen and oxygen and some carbon monoxide. As the ratio of fuel to air is increased (rich mixture) the proportion of carbon monoxide increases and that of carbon dioxide decreases, and the proportion of the latter gas in the exhaust is a good indication of the proportion of the mixture and of the completeness of combustion. This suggests the use of a carbon dioxide indicator for checking and making carburetor adjustments, a subject that has been investigated by G. W. Jones and A. C. Fieldner of the Pittsburgh Experiment Station of the Bureau of Mines. By analyzing exhaust samples from numerous truck engines, Messrs. Jones and Fieldner found that the maximum percentage of carbon dioxide in the exhaust gas is about 13.5 per cent, which is obtained with a mixture proportion of 14.75 parts by weight of air to 1 part of gasoline, whereas with a mixture proportion of 9 to 1 the percentage of CO_2 is only 5 per cent. The following table, taken from a paper on "Gasoline Saved on Government Trucks by Adjusting Carbureters by Exhaust Gas Analysis," presented at a recent meeting of the American Chemical Society, in which the experiments referred to are described and the results obtained discussed, gives the volumetric percentages of CO and CO_2 in the exhaust gas and the completeness of combustion in per cent for any proportion of air to fuel in the mixture from 9 to 14.5.

TABLE I
Results Taken From Road Tests Data

CO_2 in Exhaust Gas, Per Cent	Air-Fuel Ratio, Pounds of Air to Pounds of Gas	Completeness of Combustion, Per Cent	CO in Exhaust Gas, Per Cent
5.0	9.0	44	13.0
5.5	9.3	48	12.4
6.0	9.6	52	11.8
6.5	9.8	55	11.4
7.0	10.2	58	10.5
7.5	10.6	60	9.6
8.0	10.8	62	9.2
8.5	11.2	66	8.4
9.0	11.5	68	7.6
9.5	11.9	71	6.8
10.0	12.2	74	6.2
10.5	12.5	77	5.6
11.0	12.8	80	5.0
11.5	13.2	82	4.2
12.0	13.5	85	3.4
12.5	13.8	88	2.8
13.0	14.1	91	2.2
13.5	14.5	94	1.5

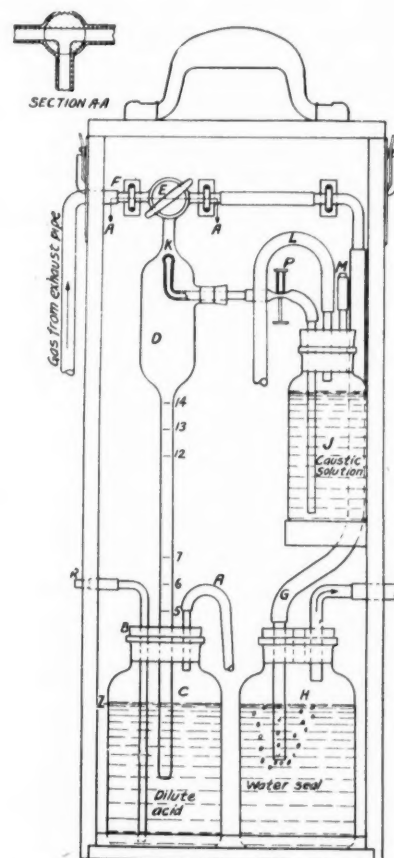


Fig. 1—Carbon dioxide indicator

The method of adjusting carbureters by exhaust gas analysis used by Messrs. Jones and Fieldner is as follows: A $\frac{1}{2}$ -in. hole is drilled in the exhaust pipe on the upper side, a short distance from the engine, under the floorboard, and a $\frac{1}{4}$ -in. copper pipe, bent at a right angle about 2 in. from the end, is passed through the hole in the exhaust pipe and placed in position so that the open end faces the stream of exhaust gas from the engine. The opening in the exhaust pipe is made gas-tight by brazing the copper tube into a half-section of a clamp which surrounds the pipe, this clamp being made in two sections, fastened together by bolts. A piece of asbestos is put around the copper tube between the clamp and exhaust pipe before tightening.

In the case of trucks, after the adjustments are made, the holes need not be plugged, and subsequent tests therefore may be made without difficulty. The front floorboard is removed and the copper tube (about 4 ft. long)

is brought up through the floorboard opening into the front seat. A convenient length of $\frac{1}{4}$ in. pressure rubber tubing is used to connect the copper tube to the indicator.

A box of convenient height is placed on the floor in the front seat compartment, upon which the indicator rests. If the roads over which the motor vehicle is driven are very rough, a pad of waste or old rags, 3 in. thick, is put between the indicator and the box to take up the vibrations.

The essential feature of the indicator is the burette *D* in which the carbon dioxide from a measured sample of gas is absorbed by spraying caustic soda solution from jet *K* against the inside walls, thereby causing the liquid in bottle *C* to rise in the slender, graduated portion of the burette in accordance with the percentage of carbon dioxide absorbed from the sample. A rugged three-way stop-cock *E* with 6 mm. bore is sealed to the top of the burette.

The caustic jet *K* has a series of fine holes evenly spaced over the circumference, at an angle of 45 deg. with its axis. From the bulb of the burette extends downward a slender tube of uniform bore, graduated directly in percentages of carbon dioxide.

The lower end of the burette extends into the bottle *C* through the rubber stopper *B*. Bottle *C* is filled to mark *Z* with a 3 per cent solution of sulphuric acid, by removing glass plug *R* and inserting a piece of glass tubing, the other end of which dips into the reserve supply of the acid solution. The acid is then drawn into bottle *C* by applying suction to the rubber tube *A*. The glass tubing is then removed, and the glass plug replaced.

Solution Must Seal Burette

The height of solution may vary between limits of 1 cm. (0.4 in.) above and below mark *Z* without affecting the accuracy of the results, but sufficient solution must remain in the bottle at all times to seal the lower end of the burette when it is filled with liquid prior to taking a sample.

Bottle *J* is filled with a 10 per cent solution of caustic soda by removing glass plug *M* and inserting a small funnel in its place. When bottle *J* is filled, the funnel is removed and glass plug *M* replaced. Enough water is poured into bottle *H* to form a water-seal with the rubber tube extending from *G*. After the caustic soda solution is blown to the tip of jet *K*, by blowing on rubber tube *L* and opening pinch clamp *P*, the indicator is ready for use.

To make an analysis, cock *E* is turned to the position indicated in the section *A-A*; liquid is forced into the burette by blowing into rubber tube *A* and when it reaches cock *E*, the latter is turned 180 deg. Thus the burette is completely filled with the acid solution.

The copper tubing leading from the exhaust manifold is connected to the indicator at *F* by heavy walled rubber tubing. The pressure is sufficient to force a stream of gas from the muffler through cock *E* and out through waterseal *H*. When the line has been purged with gas, a sample is taken into the indicator by turning cock *E* 90 deg. to the left. All of the liquid is forced from and some gas will be forced out through the bottom of the burette into bottle *C*. Cock *E* is then turned 90 deg. to the right, and the gas in the burette is allowed to stand 30 seconds, to permit it to come to the surrounding temperature and the burette to drain. Allowing the gas to stand and cool and contract draws some liquid from *C* into the bottom of the burette. At the end of 30 seconds, cock *E* is turned to the left, and enough gas is allowed to enter the burette to bring the gas volume to the bottom; *E* is then turned 90 deg. to the right.

There is now a definite, measured volume of gas in the

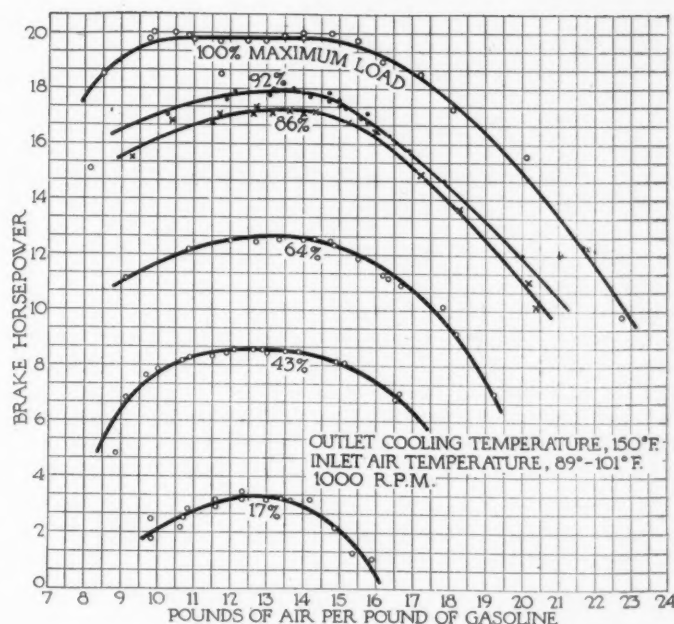


Fig. 2—Curve showing relation of power to air-fuel ratio

burette, at the same temperature as the indicator. Caustic soda is forced into the burette from jet *K* by blowing on *L* and opening pinch-clamp *P*. Six or more separate small charges of the caustic solution are forced into the burette in succession, at intervals sufficient to allow the solution to drain down the burette before the next charge is introduced. (An interval of 10 seconds between charges has been found sufficient.) If more time is allowed, the CO_2 is removed before the sixth charge is introduced, but the same result is obtained. The caustic soda solution sprayed into the burette quickly removes the CO_2 , and the solution in *C* rises into the stem of the burette to a height depending upon the amount of CO_2 present. The highest point reached by the solution after the sixth charge has been introduced is the correct reading.

The indicator is made ready for another analysis by again blowing into tube *A*, and filling the burette as previously directed. When forced into the burette, the dilute sulphuric acid in *C* neutralizes the caustic soda solution, so there is no absorption of CO_2 while the sample is being taken and brought to the surrounding temperature. Each time the burette is filled a small quantity of solution is blown over into bottle *H*, so that the level of the liquid in *C* is kept approximately at *Z*. A few drops of phenolphthalein solution is added to the caustic soda

TABLE II

Truck No.	Capacity	Carbureter	Before Adjustment			After Adjustment		
			CO_2 per cent	Air-fuel Ratio	Completeness of Combustion	CO_2 per cent	Air-fuel Ratio	Completeness of Combustion
4	5 ton	Stromberg G-3	7.3	10.4	59	10.4	12.4	76
5	5 ton	Stromberg G-3	7.7	10.7	61	11.6	13.3	83
6	5 ton	Stromberg G-3	8.0	10.8	63	11.5	13.2	82
8	5 ton	Stromberg M-3	9.9	12.1	73	10.7	12.6	78
9	5 ton	Stromberg G-3	7.6	10.6	61	11.2	13.0	81
12	5 ton	Stromberg G-3	9.9	12.1	73	11.2	13.0	81
19	7½ ton	Stromberg G-3	8.9	11.4	68	12.2	13.6	86
20	7½ ton	Stromberg G-3	9.0	11.5	69	11.5	13.2	82
21	7½ ton	Stromberg G-3	8.5	11.2	66	11.4	13.1	81
22	7½ ton	Stromberg G-3	12.3	13.7	87	12.3	13.7	87
23	7½ ton	Zenith	9.1	11.6	69	10.3	12.4	76
24	7½ ton	Stromberg G-3	8.9	11.4	67	12.0	13.5	85
26	7½ ton	Stromberg G-3	7.8	10.0	56	10.8	13.1	81
27	7½ ton	Stromberg G-3	6.7	10.0	59	11.2	12.7	79
31	2½ ton	Stromberg G-3	7.2	10.4	59	13.2	14.3	92
Average.....			8.6	11.2	66	11.4	13.1	82

solution, which turns the solution in *C* pink when it becomes exhausted. The bottle *J* holds sufficient caustic solution to make from 25 to 35 determinations, depending on how economically the solution is used.

It is important, when the first charge of caustic soda solution is blown into the burette, that only enough pressure is applied to barely cause the caustic solution to run down the sides of the jet, otherwise a small bubble of gas will be blown out of the bottom of the burette, and this in turn will give too large a percentage indication for carbon dioxide.

For adjusting carbureters on trucks, the tests should be made under loaded conditions and at regular service speeds. After connecting up the indicator to the exhaust, the operator gets into the seat with the driver and instructs him to drive the truck in the usual manner. Samples of the exhaust gas are then taken and analyzed without stopping the truck, and under different operating conditions. As only two minutes is required to sample

and make the test, several determinations may be made while the truck is operating at different speeds, especially on the level and up grades.

In Fig. 2 are given curves showing the change in power output with fuel mixture ratio for different percentages of maximum load. The curves were obtained from laboratory block tests with one engine, one fuel and one engine speed, and therefore may not be accurate for all engines, all speeds and all fuels, though in a general way they will serve as a basis for carbureter adjustment. The percentage of CO₂ which the exhaust should contain varies with the vehicle tested. As a general rule 12.5 per cent is not too high a value (fuel ratio, 13.8), and in some cases it may even be increased to 13.0 per cent.

Tests made by the method described on fifteen of the trucks used by the Government Fuel Yards gave the results recorded in the following table, which brings out the economy in fuel consumption that may be realized by applying this method of carbureter adjustment.

Closed Car Production in 1921 Gains 96 Per Cent Over 1919

A 96 PER CENT increase in the production of closed cars in 1921 over 1919 is the outstanding figure in the census of the automobile industry just completed by the Bureau of Census. In general a decrease is noted in the number and value of all automotive products in the year 1921 as compared with 1919. A 14 per cent increase in roadster models and a 495 per cent increase in tractor output are the only other marked exceptions.

Following are detailed, comparative statistics for all classes of automobiles, trucks, trailers and tractors, with table showing the values:

Products	1921	1919	Per cent of de- crease (1)
Aggregate value of products	\$1,666,140,189	\$2,387,903,872	30.2
Automobiles, gasoline and steam:			
Number	1,585,395	1,868,310	15.1
Value	\$1,320,175,169	\$1,722,626,704	23.4
Passenger vehicles:			
Number	1,435,161	1,551,276	7.5
Value	\$1,140,870,998	\$1,314,069,614	13.2
Open—Touring:			
Number	898,150	1,224,347	26.6
Value	\$677,523,810	\$977,410,998	30.7
Roadsters and runabouts:			
Number	195,545	171,548	+14.0
Value	\$119,398,745	\$138,555,714	13.8
Closed:			
Number	302,528	154,255	+96.1
Value	\$325,844,060	\$196,047,447	+66.2
Chassis:			
Number	38,702	(2)	
Value	\$17,575,507	(2)	
Other varieties:			
Number	236	1,216	80.6
Value	\$528,876	\$2,055,455	74.3
Public conveyances (cabs omnibuses, etc.):			
Number	2,198	1,877	+17.1
Value	\$5,658,334	\$3,100,447	+82.5
Government and municipal, etc. (ambulances, fire department and patrol wagons):			
Number	1,027	2,778	63.0
Value	\$8,432,664	\$13,561,284	37.8

Business vehicles:			
Number	147,009	312,379	52.9
Value	\$165,213,173	\$391,895,359	57.8
Delivery wagons:			
Number	15,060	17,272	12.8
Value	\$10,645,028	\$14,696,249	27.6
Trucks:			
Number	91,236	101,734	10.3
Value	\$88,952,716	\$193,027,127	53.9
Chassis:			
Number	40,200	192,418	79.1
Value	\$63,620,212	\$181,888,892	65.0
All other:			
Number	513	955	46.3
Value	\$1,995,217	\$2,283,091	12.6
Trailers:			
Number	3,102	15,606	80.1
Value	\$1,749,970	\$6,533,753	73.2
Tractors:			
Number	6,599	1,109	+495.0
Value	\$3,729,476	\$1,953,753	+90.9
Electric vehicles:			
Number	1,114	3,034	63.3
Value	\$2,939,904	\$6,223,884	52.8
All other products, including repairs, value..	\$337,545,670	\$650,565,193	48.1

(1) A plus sign (+) denotes increase.

(2) Included with business vehicles in 1919.

The number of passenger automobiles manufactured during 1921, classified according to value, and the number of business vehicles, classified according to tonnage, are given in the following statement:

Passenger automobiles:	
Complete cars and chassis	1,435,161
Value up to \$800	967,965
\$801 to \$1,500	298,435
\$1,501 to \$2,500	127,607
\$2,501 to \$3,500	33,286
\$3,501 and up	7,868
Electric vehicles, complete cars and chassis	1,114
Motor trucks, including delivery wagons:	
Complete cars and chassis	147,009
Up to ¾ of ton	26,942
From 1 to 1½ tons	96,044
From 2 to 3 tons	16,505
From 3½ to 5 tons	6,420
From 5½ tons up	1,098
Other vehicles (public conveyances, ambulances, fire apparatus, etc.)	3,225

Farmer Buying Power Much Higher Than It Was in 1914

Table showing barter value of chief money crops in terms of identical motor cars in 1914, 1919 and 1922 contains illuminating data. Proves automobile makers no profiteers.

Comparative Table Showing Barter Value of Farm Products in Terms of Motor Cars

	Ford			Overland			Buick			Studebaker			Hudson		
	1914	1919	1922	1914	1919	1922	1914	1919	1922	1914	1919	1922	1914	1919	1922
Price	\$550	\$525	\$393	\$950	\$945	\$525	\$1,335	\$1,495	\$1,195	\$1,575	\$1,435	\$1,275	\$2,250	\$2,200	\$1,475
Bu. Corn.....	790	369	540	1340	595	705	1880	1053	1637	2218	1010	1747	3170	1549	2020
Bu. Wheat.....	604	229	322	1044	369	430	1467	653	980	1730	626	1045	2472	960	1209
Lbs. Cotton.....	4583	1381	1572	7916	2223	2100	11,125	3776	4780	13,125	3776	5100	18,750	5790	5900

CONSIDERABLE misapprehension exists concerning the relative ability of the farmer to buy automotive products at this time as compared with 1914, the last year before the great war sent the pendulum of prices swinging dizzily upward.

If the three great "money" crops—corn, wheat and cotton—were placed on a barter basis in exchange for representative motor cars, it would be found that it takes much less of them at present market prices than it did eight years ago to buy a car.

Obviously, when all Europe had been fighting for years and was dependent upon American farms for its food supply, say in 1919, with the result that crop prices had reached extraordinary levels, the farmer had all the best of it. The automotive industry probably did less profiteering than any other in the years immediately following the close of the war.

If farmers were to compare the prices of motor cars in 1914 with those which prevailed in 1919, they would find that nearly all of them were lower. On the other hand, corn had increased in value from 71 cents in December of 1914 to 1.42 in December of 1919; wheat from 91 cents to \$2.29 and cotton from 12 cents a pound to 38 cents. Crop prices have shrunk since then, but so have those of motor cars.

The table on this page contains some illuminating data. It gives the prices of touring models of Ford, Overland, Buick, Studebaker and Hudson cars in December of 1914, 1919 and 1922 together with the number of bushels of corn and wheat and the number of pounds of cotton it took to buy them. It discloses that the farmer has all the best of it now as compared with 1914.

The recent increase in the prices of farm products has greatly strengthened the farmer's position. The estimated total crop values for this year aggregate \$8,602,000,000 or 34 per cent more than last year and 2.5 per cent more than the 1913-1917 average. The increase in general commodity prices over a year ago amounts to 18 per cent while the increase over the 1913-1917 average is 19 per cent. The farmer's buying power, therefore, has increased 16 per cent more in the last year than the average for all commodities and the gain would be more marked if his own products were subtracted from the general commodity list.

So far as the automotive industry is concerned, it has gone too much for more than two years on the theory that the farmer couldn't buy even if he wanted to because there had been too much of a slump in what he received for his products compared with what he had to pay for the things he bought. That condition has prevailed to a certain extent but the disparity has not been as great as generally supposed.

Farmers have been friendly toward automotive products because they have realized that the manufacturers have passed on to the ultimate consumer the benefit of manufacturing economies and lower material costs. They don't feel that other industries have been as fair in this respect.

With farmers already friendly toward motor cars and thoroughly sold on their utility, it ought not to be especially difficult to get their names on the dotted line in the coming year.

After a survey of conditions in the South in August, AUTOMOTIVE INDUSTRIES predicted that there would be a strong demand for motor vehicles in the cotton State. This prediction has been vindicated by results. Cotton growers are relatively better off than corn and wheat growers and the backed up demand for motor vehicles in that section has not yet been satisfied. Even the winter should be a good sales season in the South. The States which seem to offer the best prospects are Texas, North Carolina, Alabama, Mississippi and Arkansas, in the order named, although Georgia and South Carolina are much better off than they were a year ago.

In all the corn and wheat States there are sections which offer excellent selling opportunities. Manufacturers and dealers should find out what districts offer the best prospects and cultivate them intensively.

The farmer is going to buy more liberally in 1923 than he has since the prices of farm products hit the toboggan and if the automotive industry doesn't take full advantage of this fact it will be its own fault. The one point to keep in mind is that all farmers are not equally able to buy and the sections in which they are most prosperous must be cultivated most diligently. The fact remains, however, that there will be some farmers able to buy in every county in the country. If dealers fail to dig up these live prospects little sympathy need be felt for them.

Increasing the Durability of Truck Parts by Special Production Methods

Mack cylinder bores and ring grooves are burnished to give a good wearing surface, while the crankshaft is case hardened for same reason. Special fixture is used to relieve pistons at bosses. Counterweights shrunk and bolted to crankshaft.

By Donald D. Blanchard

DURABILITY is a factor of great importance to the truck user. Consequently it is decidedly worth while to secure this quality through care in manufacturing even though it involves considerable extra expense. In any case, the engineers of Mack Trucks regard the matter in this light and pay particular attention to securing long wearing parts in their vehicles.

The burnishing or rolling process used in finishing cylinder bores and piston ring grooves is said to result in hard, smooth, true and close grained surfaces with have proven more durable than surfaces finished by other means. Special tool equipment has therefore been provided for accomplishing this operation. The cylinders also undergo a heat treatment for the purpose of relieving casting strains.

There is nothing new in the use of case-hardened surfaces where wear is to be minimized, but the use of this process on crankshafts is unusual because of the time and

expense involved in applying it to pieces of such large size. Nevertheless the Mack Co. believes the results obtained warrant the expense and follow this practice in manufacturing crankshafts for their engines.

The Mack engine is a four-cylinder type with cylinders cast in pairs. A drawing of the cylinder is shown in Fig. 1. All cylinder castings are given a hydrostatic test at the foundry as well as a thorough inspection. On arrival at the engine plant the cylinder castings are again inspected before any machine operations are performed.

In the first machine operation, Fig. 2, the top and bottom of the cylinder casting and the faces to which the manifolds and valve spring cover attach, are machined. This operation is performed in a planer type, Ingersoll milling machine with two vertical and two horizontal spindles. Four cylinder castings are handled on this machine at one time. The castings are held in a fixture and are carefully lined up in such a way as to insure uniformity in the thickness of cylinder walls and in compression volumes.

Drilling Operation

A Harrington eight-spindle drill is used for the second operation. Using the milled bottom of the casting for location, two holes are drilled in the base which are used for location purposes in the boring operation which follows. These holes are located with respect to the cylinder bores by a centralizing fixture. The casting is then turned over and two holes are drilled for water cover studs.

The next operation is rough boring, $5/32$ in. being allowed for finishing. A four-spindle Moline Hole Hog is used for this operation, two castings being handled at one time. The location is from the milled base of the casting and the two holes drilled in the previous operation. This insures uniform cylinder wall thickness and a hole that is perpendicular to the base of the casting. The casting is next heat treated to relieve internal strains. This takes the place of the aging process to which castings are frequently submitted. The castings are slowly brought up to 1000 deg. Fahr., held at this temperature for two hours, and then allowed to cool off slowly with the furnace. The entire heat treating process takes about ten hours.

Bottom and top of the casting is then finished in a No. 4 Cincinnati vertical milling machine. The casting is clamped in position with its base against the table and the top face is milled off. The casting is then turned over and $1/64$ in. is milled off of the base flange to give an overall height of $157/16$ in.

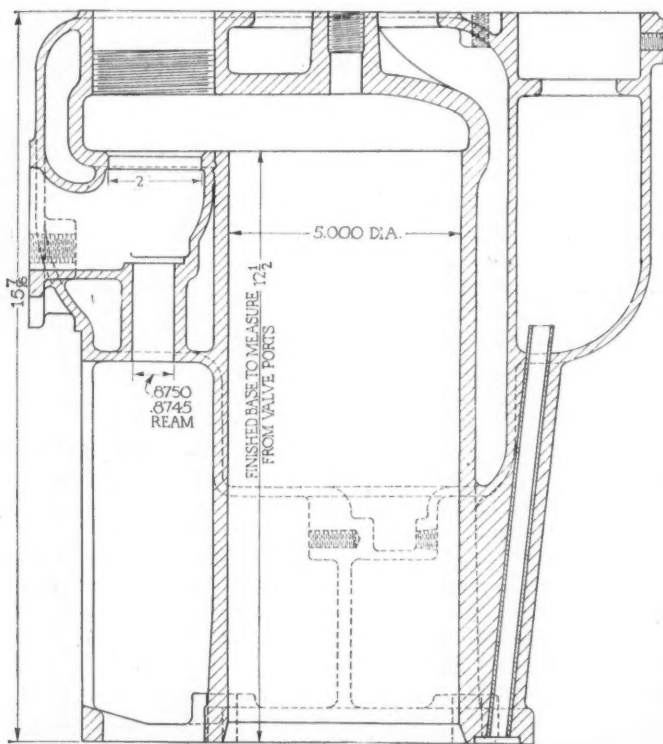


Fig. 1—Sectional view of the Mack cylinder the production of which is here described

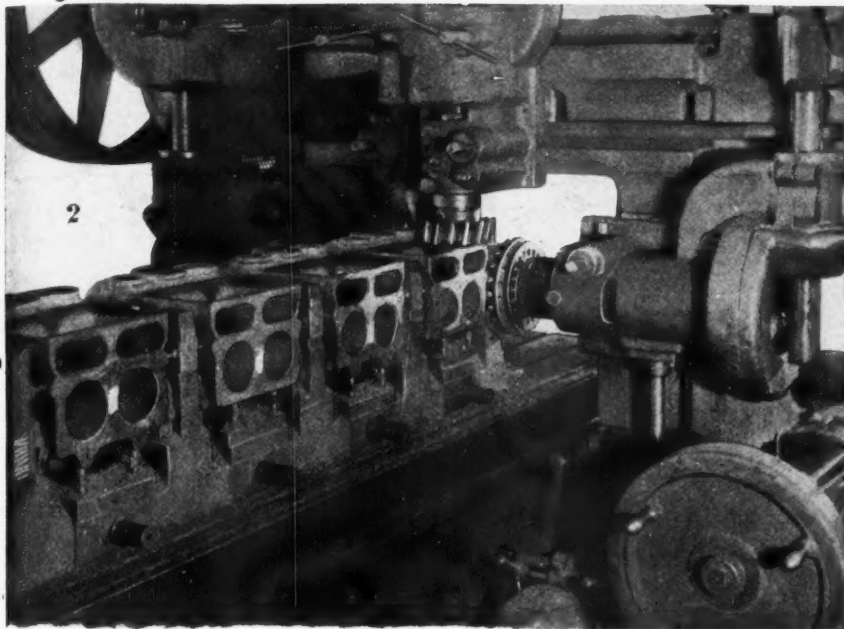


Fig. 2—The first operation on the cylinder castings is performed on a four-spindle Ingersoll milling machine. Fig. 3—The burnishing tool is shown here just before it enters the cylinder bore. This operation is performed on a large Pond Radial Drill

A Barnes drill press fitted with a Hoefer multiple spindle head is then used to drill six holes in the base of the casting. The cylinder hold down studs pass through these holes. The next operations are to finish bore, chamfer and ream cylinders. Two four-spindle Foote-Burt boring machines are provided for these operations. On the first machine the four spindles are used for finish boring, after which the bores are chamfered. All four spindles on the second machine are used for reaming. The casting is located for these operations from the milled base flange and from the two holes used in rough boring. Tolerance on this operation is 0.001 in.

The valve ports are then rough and finish bored on an eight-spindle Moline Hole Hog. The location for this operation

is from the base and from the two holes used in the cylinder boring operation. The valve ports are tapped for the valve caps and the casting is drilled and reamed for the valve guides. The horizontal surface around the valve seat is also faced. These operations are performed on an American radial drill. All holes for inlet and exhaust manifolds and all stud holes are next drilled and tapped. All tapped holes are hand tapped and core holes are plugged. The casting is then given a hydrostatic test at 100 lb. pressure.

The burnishing of the cylinder walls is the next operation, Fig. 3. The tool used for this purpose is shown in Fig. 4. The burnishing tool is driven by a 5 ft. Pond heavy-duty radial drill and is self-centering. The cylinder

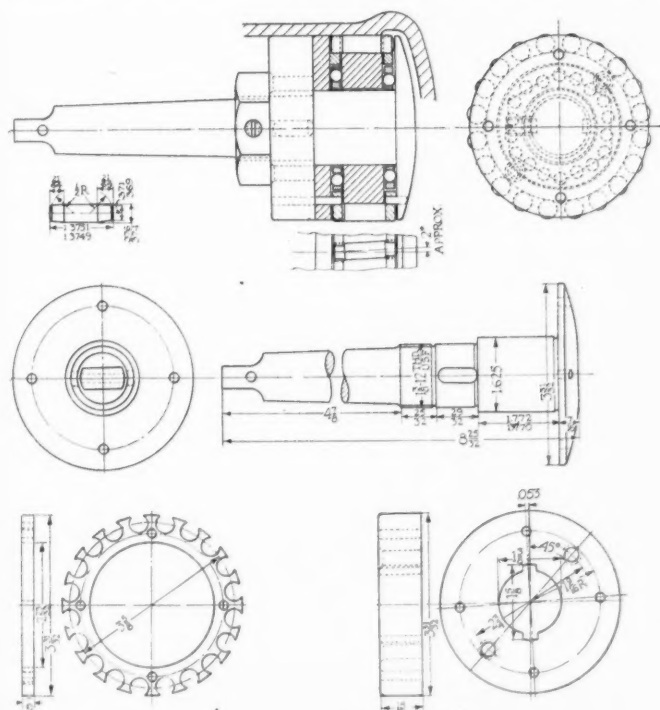


Fig. 4—Drawings of tool used in burnishing the Mack truck engine cylinder

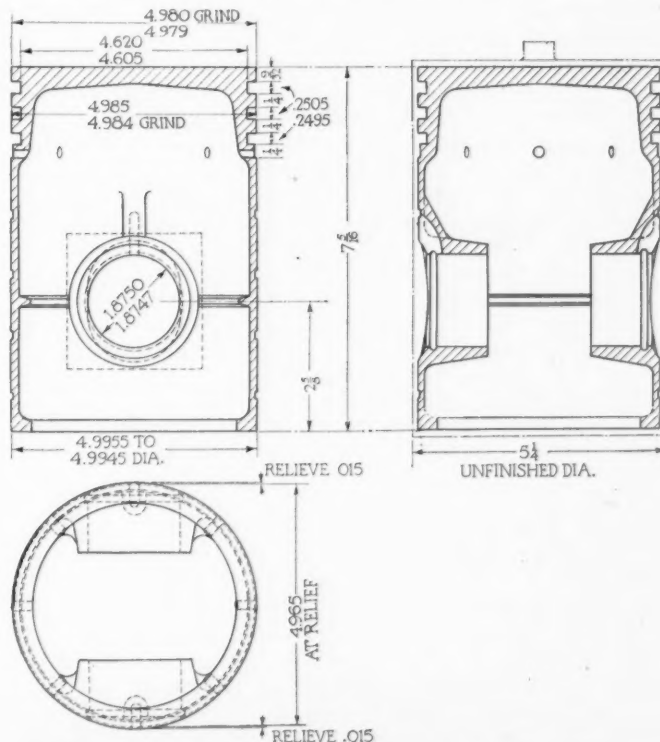


Fig. 5.—Piston used in the Mack truck engine

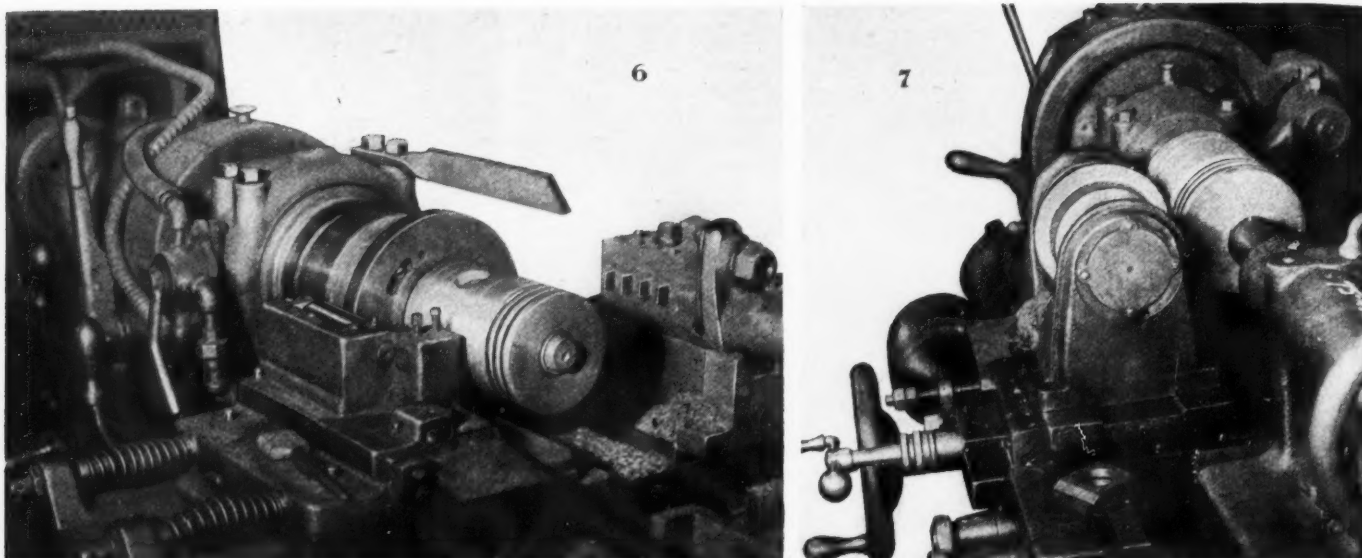


Fig. 6—Finish turning the piston showing the device for relieving the skirt at the piston pin bosses. Fig. 7—The piston ring grooves are burnished in this operation

bore is increased 0.002 in. by this operation. The casting is then thoroughly cleaned in a boiling solution of Oakite.

The valve guides are next pressed in with an air press and are then reamed to size. After testing the valve guides for concentricity with the port holes, the valve seat is faced to a proper angle. These operations are performed on Rockford drill presses. The casting then receives its final inspection. The bore is tested for roundness, straightness and squareness. The tolerance on roundness and straightness is 0.001 in.

Machine Operations on Pistons

The chemical compositions of pistons and cylinders are similar but the different foundry practice employed gives a different structure and hardness. The piston iron is alloyed to give a maximum hardness consistent with machinability and runs about 40 Shore. Cylinders are slightly softer and run about 35 Shore. A drawing of the piston is given in Fig. 5.

The first machine operation on the pistons is to bore and face the open end. This is done on a Barnes drill with the aid of a self-centering fixture insuring uniform wall thickness and weight. The piston is then chucked on a Potter & Johnson semi-automatic where it is rough turned and faced. It is then given a heat treatment, similar to that the cylinder castings receive, to relieve internal

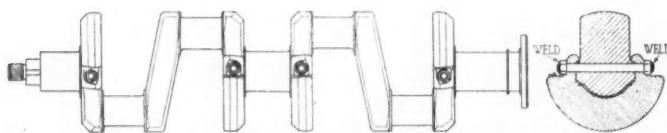


Fig. 8—Mack case-hardened crankshaft, showing method of attaching counterweights

strains. After the heat treatment, the open end, which is used for locating purposes, is finish reamed.

The piston is then chucked in a Potter & Johnson semi-automatic for the next operation. In this operation the piston is finish turned, the three piston ring grooves are cut, four shallow oil grooves 1/64 in. deep are cut in the skirt, a relief is cut immediately below the lower ring groove and the skirt is relieved at the piston pin bosses. The tool used to relieve the piston at the bosses is rather novel. A double lobe cam is mounted on the work spindle and rotates with it. This cam bears against the relieving

tool carrier, which is return operated by two coil springs. The piston is chucked so that the relieved portion comes in proper relation to the wrist pin holes. The piston is also centered for grinding during this operation. This tool arrangement is shown in Fig. 6. The approximate time required for this operation is 10 min.

The piston ring grooves are then burnished. This work is done in an engine lathe with the burnishing device mounted on the carriage. The burnishing device is shown in Fig. 7. The pistons are finished ground on a Norton cylindrical grinder and all operations up to this point are inspected. The pistons are then faced to length on a Bardons & Oliver turret lathe.

Full floating piston pins are now being used in Mack engines, endwise motion being prevented by snap rings. The next operation on the piston, which is performed on a Warner & Swazey turret lathe, is to bore the bosses, groove them for the snap rings and face the inside end. A vertical oil groove is next cut into the piston above the pin on a hand miller. Following this, the wrist pin holes are countersunk. Six oil holes are drilled in the relief ring under the lower piston ring groove, the work being done on a sensitive drill. The wrist pin holes are reamed in a drill press and finish reamed by hand. The pistons are now ready for final inspection.

Crankshaft Manufacture

The case-hardened crankshaft shown in Fig. 8 is another important feature of the Mack engine. It is counter-balanced to reduce vibration and permit of higher rotational speeds. The shaft is drop forged of No. 1020 S.A.E. steel.

The first operation on the crankshaft is to turn the two end main bearings, which is done on an engine lathe. The four crankpins are then turned on a LeBlond pin turning lathe. Turning the center bearing is the next operation. The entire shaft is then carburized to a depth of 1/8 in. This takes about 24 hours. After the completion of this process the shaft is straightened in a hand press.

The next operation is to remove the case from the fly-wheel flange and from the gear seat at the front end of the crankshaft. The ends of the shaft are next cut off and it is recentered, using the front and rear main bearing as references. The lugs which carry the counterweights are then milled on a Lincoln type miller and holes are drilled through the cheeks for the bolts which key the counterweights to the shaft. There are four of these holes and

they are drilled on a Moline Hole Hog. The crankshaft is then case-hardened by heating to about 1450 deg. Fahr. and quenching in water. This gives a hardness equivalent to a scleroscope reading of 85. The flywheel flange and the front end of the crankshaft do not harden, of course, as the carburization was turned off these portions prior to the hardening, but the quenching of the shaft has given these portions a slight hardness and to remove this and to facilitate later machining, these parts are annealed in a lead pot. The crankshaft is then sandblasted and straightened in a hydraulic press. The front and rear ends are finished turned on an engine lathe and the front end is threaded. The shaft is tested for static balance on knife edges and if found necessary it is straightened in a hand press.

The main bearings are rough ground and the shaft is

transferred to another grinder, where the crank pins are ground. The pins, main bearings and gear seat are next finished ground. A hand press is used to straighten the shaft at this stage, if necessary. A keyway is milled in the gear seat and six holes are drilled in a flywheel flange for attaching the flywheel. Both the main and the crank pin bearings are held to diameter within 0.001 in. and straight and round within 0.00025 in. The center main bearing must be concentric and true with respect to the end main bearings within 0.0005 in.

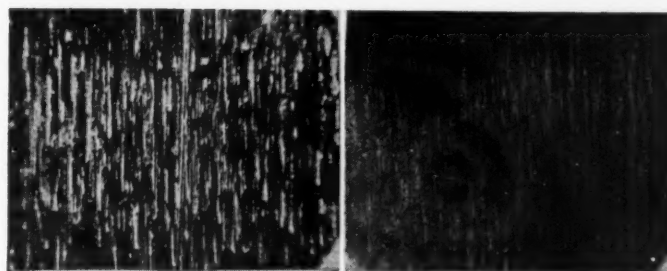
Counterweights are attached to the crankshaft in a novel manner. They are broached and are made a shrink fit on the pads on the crankshaft, and are assembled hot. The counterweights are also secured by through bolts, the nuts of which are welded in position, after which the counterweighted shaft is tested for dynamic balance.

Morris Crankshaft Buffing Machine

A MACHINE for buffing the bearing surfaces of crankshafts has been developed by the Morris Machine Tool Co. The advantages of a smooth finish for bearing surfaces of high speed machinery are apparent, and the manufacturers of this machine claim that machine buffing adds to the life of the bearing because the better finish will cause a free distribution of oil and reduce friction. In support of this claim they show two micro-photographs, prepared by the University of Cincinnati, of hand buffed and machine buffed surfaces magnified 20 times. The machine buffed surface is shown to be much smoother.

Two machines are required for the complete process. One machine buffs the main bearings, the crank being mounted between centers and driven from one end. There is a buffing wheel for each bearing to be buffed. The other machine buffs the crankpin bearings, the crank being mounted in off-set chucks and driven from both ends, the same as when being turned in the lathe. For a four-throw crank three setups are required. One machine is set up to buff the main bearings and two machines are set up to buff the two pairs of crankpin bearings on opposite sides of the crankshaft axis, respectively. For a six-throw crank four setups are necessary.

The wheels are made of hard felt about 24 in. in diameter. Pulverized glass, dressed with a crocus block from time to time, has been found to be the best polishing material. This does not change the diameter more than one-tenth of a thousandth. The wheels are mounted on ball bearings and slide in and out on slides fitted with taper gibs. This is done by the short vertical lever in front of the machine connected to the wheel slide through

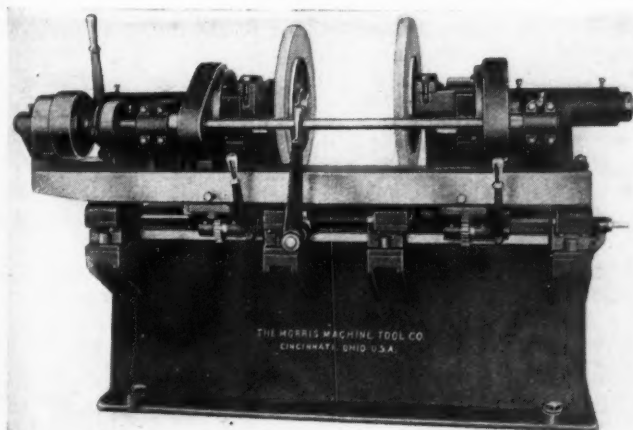


Micro-photographs of crankshaft bearing surfaces produced by the hand buffing (left) and the machine buffing (right) processes

a rack and pinion. The table on which the crank heads are mounted has a lateral motion imparted to it by the long vertical lever. The wheel slides are adjustable on the bed of the machine so the setup can be changed to suit different size cranks. The wheels are inclosed in dust hoods and so arranged that they can be connected to a dust collecting system.

Photographic Measurements by Means of Integrating Spheres

IF we wish to know the total amount of light given off by a lamp, we must measure the candle-power all about the lamp in many directions and take an average of the results. Actually to measure lamps in many different directions would require an enormous amount of time and work, and several ingenious devices to get the same result with less labor have been invented. One of the simplest and most satisfactory of these is the integrating sphere. This is simply a large, hollow, white-walled ball, inside which a lamp can be placed, with a small window so that the brightness of the inside wall can be observed. The light is reflected back and forth in such a way that the illumination is uniform over the whole surface of the sphere and the reflected light falling on the window correctly represents the total amount of the light produced by the lamp. A large integrating sphere has been built at the Bureau of Standards in Washington and a scientific paper (No. 447) has been issued describing this installation and giving the theory of measuring light by means of integrating spheres. The sphere referred to is 88 in. in diameter and weighs approximately a ton.



Morris crankshaft buffing machine

Standards for License Plate Lighting Formulated by Joint Committee

Representatives of S. A. E. and Illuminating Engineering Society agree upon specifications for acceptance tests and construction features of tail lamps and number plate brackets. Massachusetts law is basis of discussion. Uniformity throughout country desired.

By P. M. Heldt

A GOOD many if not all of the States have on their statute books laws which require that the registration number plate carried at the rear of the car shall be illuminated at night in such a manner that the number can be read by persons at a distance of 50 ft. or more, but none of these laws has been enforced in the past. The lighting equipment carried on the great majority of the cars in use to-day is either inadequate or else so unfavorably placed that the amount of light falling on some parts of the plate is insignificant, and it is absolutely impossible to read the number at night, especially with the car in motion.

The State of Massachusetts, which for some time has held the initiative in formulating improved regulations governing motor vehicle lighting, last summer passed a law under the terms of which no tail lamp is permitted to be used on motor vehicles in that State unless it has been approved by the Registrar, after having been submitted for approval to the Registrar, the application, incidentally, having to be accompanied by a fee of \$50. Following the adoption of this law the Registrar of Motor Vehicles of the State formulated a set of requirements which the lamps must meet in order to receive approval, and the law became effective in September last.

Inasmuch as practically none of the rear lighting equipment supplied by the manufacturers up to that time met the new requirements, the going into effect of the law was more or less of a shock to the industry.

Inadequate Illumination

During the early period of enforcement, out of 419 vehicles held up by the agents of the Bureau of Registration, the number plate illumination of 418 was found to be contrary to the law, or, in other words, inadequate. Therefore, every automobile manufacturer who wanted to do business in Massachusetts was compelled to change his tail light equipment. The question then arose, What if other States follow the precedent of Massachusetts and adopt regulations regarding rear signals and number plate illumination that will not allow of the use of equipment acceptable in Massachusetts? To forestall any ill-considered legislation along this line the attention of the S. A. E. and the Illuminating Engineering Society was called to the subject, and the committees of these two organizations dealing with motor vehicle lighting took up the matter and appointed a joint subcommittee to study the problems involved.

Experiments on the minimum intensity of illumination required on number plates to make them readable at the specified distances were conducted by several members

of the committee and those made by Messrs. Summers and Morrison of the Edison Lamp Works were recorded in our issue of Nov. 30 last. Others on the committee included A. W. Devine, illuminating engineer of the Office of Registrar of Motor Vehicles of Massachusetts; C. H. Little of the New York Electric Testing Laboratory; H. H. Madgsick of the National Lamp Works of the General Electric Co.; C. A. Michel of the Guide Motor Lamp Mfg. Co., and G. H. Stickney of the Edison Lamp Works.

Suggested Specifications

A meeting of the subcommittee was held at the Engineering Societies' Building, New York, on Dec. 28, and this was followed the next day by a meeting of the joint committees of the S. A. E. and the I. E. S. At the latter meeting a resolution was adopted in which, after calling attention to the conditions which led to the appointment of the committee, it is stated that:

Therefore, it is the sense of this joint meeting of the Motor Vehicle Lighting Committee of the Illuminating Engineering Society and the Lighting Division of the Society of Automotive Engineers that no specifications for lighting the registration plates can be satisfactorily applied unless there is a reasonable standardization of registration plates as regards

1. Maximum dimension of the area to be illuminated.
2. Design and spacing of digits.
3. Color contrast.

The joint committee further suggests that such standardization might be approximately as follows:

1. That the area to be illuminated be included in a rectangle not larger than 16 x 6½ in.
2. That the design and spacing of the digits be such that
 - a. The stroke be not wider than ½ in.
 - b. The spacing between strokes be not less than ½ in.
 - c. That a space of not less than ¾ in. be provided between each third digit.
 - d. The opening in such figures as 3, 5, 6 and 9 be cut wide so as to avoid confusion with each other or with figure 8.
 - e. The color be so selected as to secure high contrast between the numerals and background.

The committee also drew up specifications governing motor vehicle tail lamps and registration plate illumination. These start with a definition of the tail light as the lighting unit used to illuminate the rear end of a motor vehicle by a ruby light and to illuminate the registration plate. Under the heading of General Construc-

tion and Requirements for Acceptance it is stated that the opening in the lamp shell shall be covered by a colorless glass and shall be sufficiently large so that the light will cover the entire registration plate. An introductory note states that wherever the word "registration plate" is used in the specifications it signifies a rectangle 16 in. long and 6½ in. wide, 1/16-in. in front of the front plane of the lamp bracket. The lamp must be weather and dust-proof and so constructed as to be able to withstand the vibration to which it will be subjected in service. The lamp and plate holder are to bear such a relation to each other that the major portion of the light incident at any point of the plate makes an angle of not less than 8 deg. with the plane of the plate.

Under the heading of Laboratory Tests it is specified that the samples submitted for tests shall be representative of the lamps as marketed and shall be accompanied by the number plate holder with which they are to be used. Each lamp must have a distinctive designation and if the number plate bracket is detachable from the lamp it must bear the same designation as the lamp. In the laboratory test the lamp is to be tested with a 2-candlepower 6-8-volt incandescent bulb. The apparent illumination at any point of the plate is to be not less than 0.5 foot-candle, and the ratio between the maximum and minimum illumination is to be not greater than 30. The illumination measurement is to be made with a white blotting paper in place of the plate, owing to the small angle of incidence.

Lamp Must Meet Requirements

It is specified that no lamp shall be considered acceptable unless it conforms to the requirements of the illumination test and no lamp shall be considered acceptable if it is unsatisfactory for any of the following reasons: Excessive glare; unstable or bad mechanical construction; unduly dark or bright areas on the registration plate or excessive contrast in the illumination. It is further stipulated that the line of cut off of the light

shall not be less than 1½ in. from the edge of the plate opposite the lamp, measured perpendicularly to the plane of the plate.

Committee Program

The above is the substance of the specifications adopted by the joint committee. In the case of the S. A. E. the plan is to have the lighting division of the Standards Committee take action on the specifications and submit them for adoption to the Standards Committee at the January meeting. The meeting of the joint committee on Friday last was attended by Harry Meixell of the N. A. C. C. and H. L. Heminway of the Motor and Accessories Association. These officials will inform the members of their respective associations of the action taken at the meeting, and, of course, reports of the proceedings will also be carried to the Conference of Motor Vehicle Executives and to the motor vehicle departments of States outside the conference.

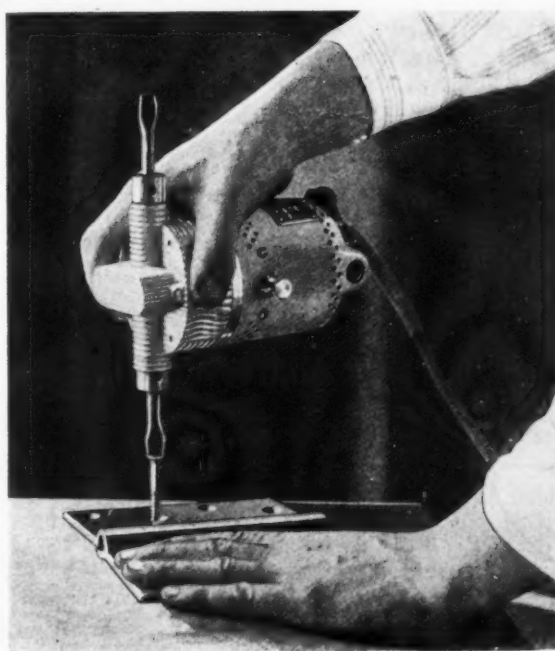
A. W. Devine of the Massachusetts Bureau of Motor Vehicle Registration, expressed the opinion that it would be unnecessary for the different States to pass any new legislation to put into force the specifications adopted at the meeting, should they desire to do so, as most of them possess the authority under their present laws. Mr. Devine also wanted it understood that the specifications adopted at the meeting did not compel manufacturers to make further changes over those which the Massachusetts regulations required them to make, but that the specifications in the main were an elaboration of the Massachusetts regulations. Some members of the subcommittee expressed anxiety that all of the States might pass laws calling for laboratory tests of tail light equipment and each ask a fee of \$50. They thought it very desirable that a test made by some generally recognized testing laboratory be accepted by all motor vehicle departments and the statement of Mr. Devine, that no additional legislation would be necessary in most States, seemed to allay fears in this respect.

Recto Electric Screw Driver

THE tool herewith illustrated was designed to permit of the driving and unscrewing of all sizes of screws which can be driven with a hand brace, in a much shorter time, and its special feature is that it needs to be held with one hand only. When the screw driver bit is replaced with a socket wrench the tool may be used for driving home nuts, bolts and lag screws.

The spindles are right and left-hand worm drive and run at 250 r.p.m. They turn only when the bit is placed in the screw slot and downward pressure is exerted to engage the positive driving clutch. Armature and gear-shafts are mounted on ball bearings. The machine is provided with air-cooling flanges, as may be seen from the illustration. An automatic burn-out protection device is incorporated in the screw driver, which weighs only 5 lb. The equipment furnished with the machine includes four tool steel bits and 10 ft. of cord and a plug.

IT was stated by our British correspondent in AUTOMOTIVE INDUSTRIES of Nov. 9 that the 18-hp. model of the British Phoenix cars, introduced in 1920, had not gone into production. But we now learn that production was then in progress and the makers ask us to mention this fact to counteract any false impression that may exist where negotiations are contemplated or under way concerning this model.



Recto electric screw driver

Smaller Engines Feature British Motorcycle Show

Gain in use of overhead valves and unit power-plant construction. Single-cylinder, four-stroke leads in popularity. Stock component parts appear in greater numbers. Price reductions average 17 per cent. Lightweight machines tap new market and interest is keener.

By W. M. Bourdon

THE motorcycle show at Olympia brings to light a number of prominent developments in British practice, and, strangely enough, the changes resemble those which were cause for remark at the recent car show. There are, for example, general reductions in engine size for given duties, an increased number of overhead valves, and many additional instances of unit power-plant construction.

For all except the low-priced models the belt drive is disappearing. Instead of this type of transmission (with a primary chain drive from engine to gearset) being standard, with the all-chain transmission obtainable at an extra cost, the latter is now standard but the other can be had at a reduced figure. Some makers have given up the belt altogether.

Another development is the far wider use of expanding brakes, acting on drums attached to or integral with the wheel hubs. This type has come in with a rush, and in the majority of cases it is supplied by a Birmingham firm specializing in this fitting, which uses an oval section spring-steel ring located in a groove in the shoes, under the fabric facings, for a relief spring. A flat faced cam operates directly upon contact plates of hardened steel secured to the aluminum shoes. Many riders do not like this type of brake at the back so well as the V rim (pedal operated) type, averring that it does not respond so quickly and that the ideal brake equipment is an expanding set on the front wheel and a V rim outfit at the back, the former for lengthy applications and the latter for emergency use.

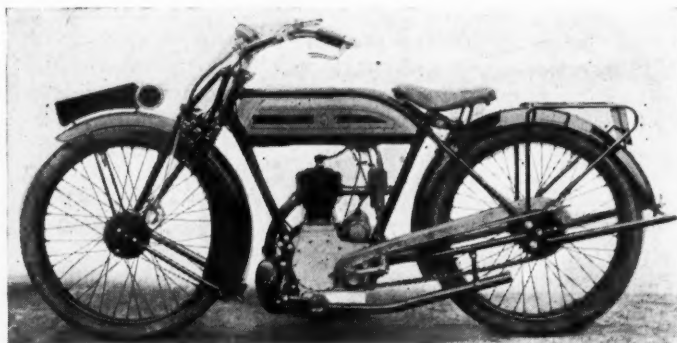
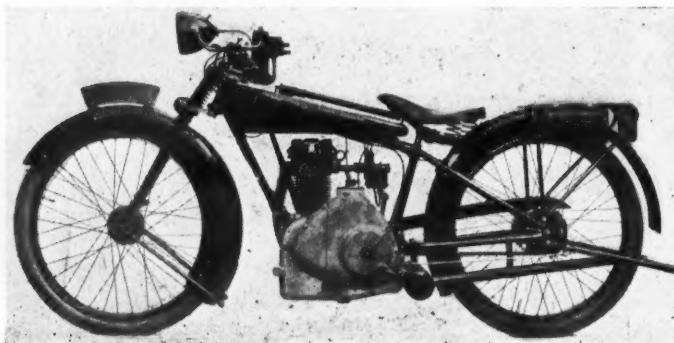
The two-stroke cycle engine has secured still more adherents for models up to 3 hp. (say 18 cu. in.), but its

sphere lies chiefly in the smaller sizes. The all-around most popular type of engine is unquestionably the single-cylinder four-stroke. Two counts taken recently, one near London and the other in the North, showed the following percentages of motorcycles passing in two hours: Single-cylinders, 58 per cent; Vee twins, 30 per cent; horizontally opposed twins, 12 per cent. No "fours" were observed. So far as British models catalogued for 1923 are concerned, 73 per cent have only one cylinder.

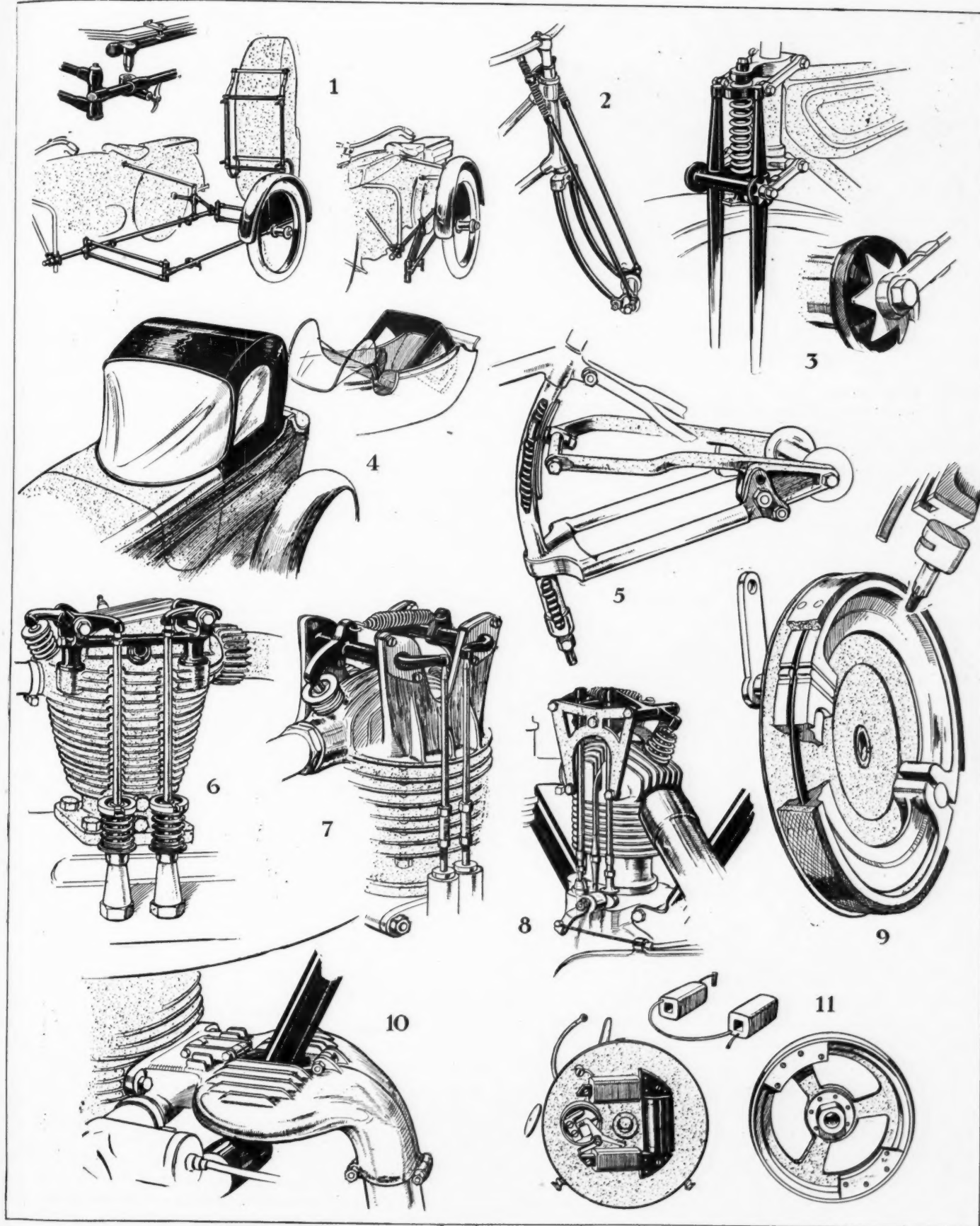
The annual road races in the Isle of Man are accountable for the increased popularity of the single-cylinder, for they have resulted in its specific output being increased to such an extent that the 350 cc. (21.3 cu. in.) type is now doing work that only a few years back was considered strenuous enough for the 500 cc. size. Similarly, the 500 cc. has cut into the realm of the V twin of 750 cc., and the 250 cc. lightweight into the 350 cc. field, all of which sizes are now offered for sidecar work, even the smallest. For solo work the 250 cc. is threatened by something still smaller.

"Ultra-lightweight" Featured

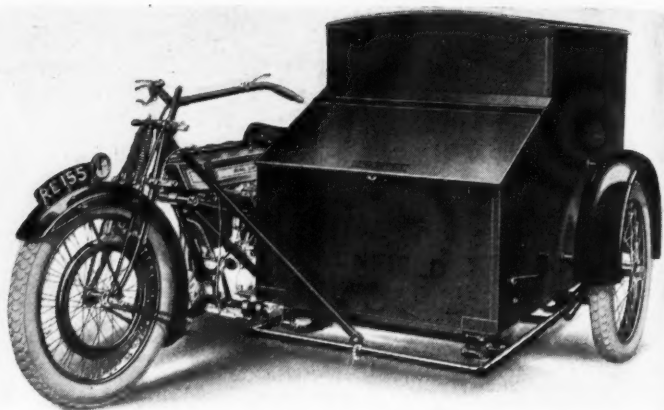
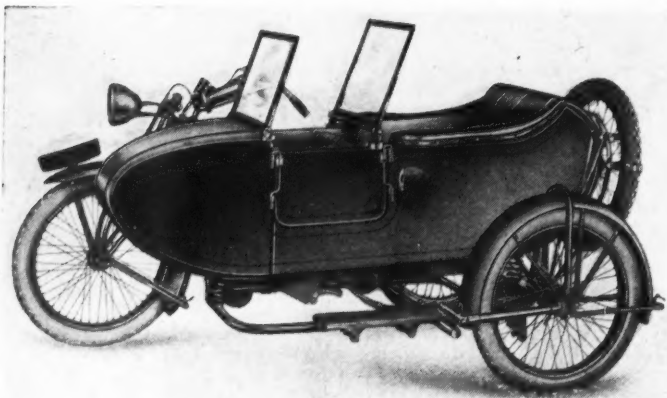
The 250 cc. machine—termed the "lightweight"—at this time last year was looked upon as the smallest standard type of motorcycle, as distinct from motor-assisted or motorized cycles. But at the present show the "ultra-lightweight" is an outstanding feature in a score of makers' exhibits, and it has put up performances in tests which are on a par with those considered remarkable for the next larger type not so long ago. This ultra lightweight type of motorcycle had isolated representatives at Olympia last year, but during the past twelve months it



(Left) New 2¼-hp. (15.1 cu. in.) overhead valve unit powerplant Rover. (Right) New 3½-hp. Triumph with unit powerplant. Primary drive from crankshaft to gearset is by train of three pinions



1—Dorway folding sidecar. Body with subframe is detachable in 20 secs. and allows chassis to be folded to pass through 28-in. doorway. 2—Spring fork attachment applied to Airolite motorcycles. 3—Spring forks with friction checks on new 2½-hp. Rover lightweight. 4—Lea-Francis folding top coupe sidecar. 5—P. V. rear springing. Nut below extension of curved tube serves to adjust helical spring. 6—Overhead valve gear of new 30 cu. in. Norton single cylinder. 7—New 2½-hp. Rover lightweight overhead valve gear. 8—New overhead valve A. J. S. Note exhaust valve lifter comprising additional hand operated pushrod, and also stirrup with right and left hand sleeve nut for holding down cylinder. 9—Webb expanding brake. Relief spring located in groove in aluminum shoes. 10—Combined aluminum inlet and exhaust pipes on Connaught two-stroke engine. 11—Flywheel magneto with lighting coils on Villiers line



(Left) Type of tandem sidecar rapidly becoming popular among British motorcycle users. Accommodates one adult and child. (Right) Tradesman's sidecar for 600-lb. loads fitted to 8-hp. Enfield

has been developed and adopted as a standard pattern by a great many more firms. At present it has no officially recognized limitations in either weight or engine capacity, but is usually considered to have a piston displacement not exceeding 175 cc. (10.6 cu. in.).

Broadly, this ultra lightweight has a two-stroke single-cylinder engine in a frame specially designed for it with spring front forks and 24 x 2 in. tires. In its simplest form it has a belt drive direct from engine pulley to rear wheel, with pedaling gear for starting and assisting on hills. Thus equipped it sells at approximately £25, but as a rule it is supplied with a two-speed gear instead of pedals, and there is then a primary chain drive from engine to gearset with a belt to the wheel, the extra charge for this outfit being about £5; the gear ratios are generally $7\frac{1}{2}$ to 1 with pedals and 16 and 6 to 1 with two gears.

The motor-scooter is almost defunct, though there are one or two examples at the present show.

Turning to the other end of the scale of sizes, no British motorcycle has an engine of more than 1000 cc. capacity (61 cu. in.), though two American makes are seen at Olympia with even larger dimensions than previously (Indian 1234 cc. and Harley Davidson 1208 cc.). Incidentally, these two makes, the Henderson "Four," and a new-comer to England known as the "American X" are the only representatives of the American motorcycle industry.

The majority (72 per cent) of British twin engines have V-set cylinders at 50 deg., for the horizontally opposed type has not gained the headway that was expected a year or two back for sizes up to 6 hp. (say 48 cu. in.). Very few of the new models have other than single cylinders, the reason being that the prevailing demand in the motorcycle world is for economy in first cost and operating costs.

Folding Sidecar Chassis

Beyond an increasing prevalence of the duplex type of tubular frame there is very little change to record in the fundamentals of motorcycle construction in England. The pressed steel frame has not been taken up by any maker of importance; in fact, the Turacar is the only example at Olympia. This machine is familiar to American manufacturers. There are a few new models with frames sprung at the rear but none of them appears to offer a definite solution of the problem involved, that of combining flexibility with lateral rigidity, simplicity and low cost of production.

A folding sidecar chassis was shown which enables the outfit with the sidecar body removed to be wheeled through a 28-in. doorway. Folding sidecars have been

heard of before, but the feature of this new type, termed the Dorway sidecar, is that the body with a sub-frame and the springs can be detached or refitted by two people in ten seconds and the chassis folded instantly. The chassis consists of tubular units normally rectangular in plan, hinged at each corner so that they can be folded like a parallel ruler. There is a socket at each corner to receive four pegs attached to the sub-frame; to provide against rattle, spring-loaded catches secure each peg, but the whole thing when erected is automatically held rigid and at right angles to the machine; passenger weight merely increases the interlocking effect. This sidecar design is found on over a dozen motorcycle makers' stands, for the trade generally has appreciated the practical nature of the scheme. In addition, the system permits of the use of both passenger and commercial bodies. The price is very little more than that of the ordinary sidecar and but little weight is added.

Single-Sleeve, Air-Cooled Engine Gains

Reverting to engine design, there still remains but one example of water-cooling, the Scott two-stroke, two-cylinder machine. Oil-cooling has increased, for whereas a year ago it was found on only one make of motorcycle, it has now been adopted by at least half a dozen firms. All these engines are on the Bradshaw system.

The most threatening competitor of the usual air-cooled poppet valve motorcycle engine is, however, the single sleeve air-cooled, made under Burt and McCollum (Argyll) patents. It is a stock type, made in various sizes from a 350 cc. (21.3 cu. in.) single-cylinder to a 1000 cc. (61 cu. in.) twin. Its silent operation and maintained efficiency are giving it increased favor. As a rule it is offered by motorcycle makers as an optional power-plant in various models of machines, sometimes at the same price, sometimes at a slight extra charge. It is now available with something like twenty different makes of machines.

The two-stroke (valveless, three-port) engine continues to gain in popularity for engines of a piston displacement up to 18.3 cu. in.; actually 78 per cent below that capacity are of this type. The four-stroke is generally considered to be desirable for anything above the capacity named. Of all sizes 52 per cent have L heads, 9 per cent overhead valves and 30 per cent are valveless. Aluminum pistons have increased appreciably and are now used in 23 per cent. Splash lubrication with a semi-automatic drip feed to the crankcase is used on 84 per cent of the engines and there is no increase in other systems. Ball bearings for the crankshaft and roller bearings for the big end are more in evidence. Even for two-stroke engines, which all have crankcase compression, ball and roller

bearings are being used for the crankshaft, though there is then, of course, a short compression bush outside the anti-friction type.

As regards transmissions, two new models have shaft transmission and worm final drive. Dry plate clutches are almost universal, these usually having cork inserts; there are only three plates in most clutches for machines up to 3 hp. and many above that rating. Fully 80 per cent of machines under 3 hp. are offered with either two or three gears at the purchaser's option, though an extra charge is made for three. All users prefer three, naturally, but personal observation suggests that not more than 30 per cent pay the extra £5 or so when it is demanded.

Twelve months ago only two British motorcycles were offered with four speeds, but the number has now increased to seven, and in one case it applies to one of the ultra-lightweight models, a machine which made a notable performance in the Auto Cycle Union's Six Days' Trial in September. Rudge-Whitworth offers four speeds with one model for the first time. Most of these four-speed gearsets are arranged on orthodox motorcycle lines, but one well-known make has a dual chain drive from engine to gearset, each with an expanding friction clutch, and a two-speed sliding gearset in addition. Operation of clutches and sliding gears is by the same lever, which has lateral and longitudinal movements, the first for clutch operation to bring either chain into use and the second for sliding the gears.

More Makers Adopt Unit Power Plant

The vast majority of gearsets are separate from the engine, though, as already mentioned, there are a number of additions to the makers using unit powerplants. Triumph—with the biggest output of British motorcycles—has adopted this arrangement on a new 350 cc. model, and Rover has it in a new lightweight of 250 cc. The Triumph design embodies an intermediate pinion to convey the drive from a crankshaft pinion to the gearset, but in the Rover a triangulated roller chain is used, the third sprocket being on the magneto shaft, the magneto being carried by means which permit of chain adjustment to be made.

Another novel feature of this new Rover is the use of spring front forks with helical springs far more flexible than usual and embodying a pair of frictional disk checks, reminiscent of the Hartford spring checks for cars; in the Rover the disks are located at each end of one of the front fork fulcrum pins.

Quickly detachable interchangeable wheels remain restricted to the high-powered and expensive machines supplied usually with a sidecar, a spare wheel and tire being even then subject to an extra charge.

The use of stock components in British motorcycles continues to increase. Stock engines appear in 48 per cent of machines, as compared with 46 last year and 38 in 1920. The J.A.P. line is still most popular, for of stock engines 41 per cent are of this make; this is a drop of 12 per cent from last year. In the two-stroke field the Villiers engines are almost exclusively used where a stock model is adopted. These are now made in three sizes (one last year), all identical in design, with outside flywheel. The latter has the rotating members of a flywheel magneto attached to it, the coils and contact breaker being attached to an inside cover plate having a lever adjustable for varying the timing. For a small extra charge additional coils are fitted to provide an alternating current for direct electric lighting.

Stock gearsets are carried on 64 per cent of the machines (58 last year and 55 in 1920); of these the Sturmey-Archer line is adopted for 66 per cent, including both two and three-speed sets with unit clutches of the dry

plate and multi-plate varieties and kick-starting gear. There is one maker of four-speed gearsets who has been conducting an active publicity campaign for a year, and one maker of motorcycles has now adopted this outfit as standard.

Stock hubs and front forks are also in wide use, but frames are usually exclusive, as evidenced by the immense variety of frame designs. Welded instead of brazed joints are used by only two or three firms; one objection to welding is the need which generally arises in the case of a damaged tube for sending the frame back to the makers for a new tube to be fitted, whereas local repairers as a rule can deal with brazed frames.

It may be said here that motorcycling shows signs of becoming still more popular in England. The lightweight machines have tapped a new source of business and this type is widely used by all classes; it appeals to men and women of all ages and to youths and girls from fourteen and upward, on account of its serviceability, convenience and low cost. Many doctors use it for town journeys in fine weather and for emergency calls; professional and business men, clerks and artisans, find it often more convenient or more economical than a car; ladies run into town on it for shopping from country districts; short-pursed "family" men use it for country trips with a light sidecar attached and even make extended tours in hilly districts.

As for the larger types, solo and sidecar outfits, their vogue is also increasing, and it is not only on the score of cost that these machines make their appeal. The expensive sidecar outfits, for example, are preferred to the light car by a great many users because of their greater speed; they are often compelled to carry three or four people, for the tandem sidecar is increasing in favor.

Prices for 1923 show a reduction averaging 17 per cent, and so far as it is possible to classify types and prices the following may be said to apply:

50- 100 cc. motorized bicycles.....	£20-£25
130- 170 cc. ultra-lightweights	25- 35
250 cc. lightweights (two-stroke)	35- 45
250 cc. lightweights (four-stroke)	40- 55
350 cc. single-cylinder	50- 65
500 cc. single-cylinder	65- 95
500- 750 cc. twin-cylinder	80-100
750-1000 cc. twin-cylinder	100-130

All these prices apply to solo machines, without lighting system in most cases; it is exceptional to find prices inclusive of lamps or generator—acetylene or electric—though the Triumph Co. has just adopted the "full equipment" policy with electric lighting and lamps included in all quoted prices.

Scandinavia Needs More Distributors

AUTOMOTIVE exporters to the Scandinavian countries are being advised that their automobile business in those countries is suffering because of the practice employed by some American firms of having the same agent represent them throughout Scandinavia.

Information forwarded to the United States Bureau of Foreign and Domestic Commerce states that the best method for American exporters to employ is to have a representative in Denmark, another in Sweden and a third in Norway. "For the reason," says the report, "that different languages are spoken and different methods employed in each of these countries. It is much better to pick out a live firm in each country. The Danish automobile agent can never push the sale of automotive equipment in Sweden and Norway in the same manner as could a local firm, and vice versa."

Automotive Industry Is Credited with Aircraft Engine Success

Bureau of Aeronautics, Navy Department, expresses satisfaction with power plant progress in annual report. Criticizes aircraft manufacturers for failing to meet contract dates and poor design of planes submitted. Predicts general use of blended gasoline.

IN the recent annual report of the Chief of the Bureau of Aeronautics, Navy Department, Rear Admiral Moffett expresses satisfaction with the procurement of engines from the automobile industry. He calls attention to the fact that the aeronautical engine industry is included in the great automotive industry and is in an entirely different position from the aircraft industry proper. The report points out that "engine building is in the hands of strong firms with the technical, metallurgical, research and testing facilities of the automotive industry behind them. Consequently, the bureau has found no necessity for engaging in general engine design. Rather it invites engine builders to submit sample engines to rigid naval tests, and from the failure of engines on test the bureau can insist on modifications, often slight, until the engine gives satisfactory service. The development of aeronautical engines becomes, therefore, a matter of intensive testing, alteration, and testing again until faults are overcome."

Admiral Moffett says "the Navy has long realized the urgent necessity for realizing a greater degree of dependability and durability in all types of aircraft power plants. The greatest obstacle which has existed, and which still exists, to the development of both commercial and military aviation has been the relatively low degree of dependability and the relatively large cost of maintenance of aircraft, and particularly of aircraft power plants. These factors have made necessary the provision of large and expensive repair establishments and of inordinately numerous and highly skilled repair and maintenance personnel."

"The standard of durability of aircraft engines in this country and abroad has been set by the requirement that an engine must satisfactorily complete a 50-hr. endurance test. In all the Navy's development work, both in new types and modifications in old types, considerations of durability, dependability, low first cost and low cost of maintenance have always held an important place."

"**T**HE standard acceptance test for new types of aircraft engines has been, in this country and still is in countries abroad, a 50-hr. run. An engine recently built for the Navy has just completed a test of 300 hr. of running—six times as long as the usual acceptance tests. This is the first aircraft engine ever built to complete so severe a test. As a result of information gained in this test and previous unsuccessful attempts to measure up to so high a standard, it is confidently expected that a number of other engines developed since the war to meet the requirements of the Navy will

soon successfully complete tests of a similar character."

The annual report shows that the Navy Department is doing its best to solve problems in connection with reduction gears. Development work has been proceeding in this line under Navy control for three years, and for the past year engines fitted with reduction gears have been in successful operation in naval aircraft in everyday flight service. In the course of this work an industry has been developed which can manufacture successful reduction gears for all types of engines.

One of the significant features of Admiral Moffett's report is the prediction that the near future will see the general use of a blended gasoline for all aircraft, where maximum performance is wanted. It is asserted that the extra expense is negligible.

THE Bureau of Aeronautics claims that the only development work which has been undertaken, or which has met with any success in this country for the fuel injection aircraft engines has been initiated, fostered and largely financed by the Navy.

Admiral Moffett advises the Secretary of the Navy that until commercial aviation furnishes a market the aircraft industry must live on government orders, principally from the Army and Navy.

Criticism of domestic aircraft manufacturers is made in calling attention to the fact that they supplied only 37 planes while 52 were delivered by the Navy aircraft factory. The bureau contends that this situation is entirely inconsistent with the status of orders as of July 1, 1922, at which time domestic manufacturers had on order and undelivered 153 planes and the Navy aircraft factory 41 planes.

According to the Navy Department the explanation of the situation lies in the fact that during the year private firms with very few exceptions have been most unsatisfactory in meeting their contract dates. Two large contracts had to be cancelled because of the unsatisfactory design of the sample plane submitted, and another large contract is still in suspension.

In the opinion of the Bureau of Aeronautics, such difficulties are inherent in the art so long as the builders continue to attempt radical innovations and make guarantees that they are unable to meet. More recently three contractors, who built to the bureau's designs or their own designs, worked out in co-operation with the bureau, have established what seems to be a record in the industry by submitting sample airplanes within the contract time, within the designated weight and with an air performance in excess of that guaranteed.

While the bureau believes that a free hand should be

given to private initiative and ingenuity in developing naval material, it is folly to contract for the improbable or to finance experimental building by firms, without adequate technical knowledge and experimental facilities. Such facilities are too expensive to be maintained by the smaller firms, and it appears necessary, if real competition is to be had, for the bureau to ask for bids for the construction of airplanes to its own general designs which can be based on service experience and the extensive technical and scientific data available to the government. This procedure

is identical with that which the department has adhered to since the first steel ships were contracted for. Original designs of private firms are proprietary articles and can be considered on their merits when submitted.

The bureau's policy is to encourage aircraft manufacturers in every practicable way, but at the same time to authorize a sufficient amount of production at the aircraft factory to safeguard the government's interests relative to cost and time of construction, and to stabilize the labor turnover.

Recent Publications Present Valuable Material for Factory Executives

A CONSIDERABLY enlarged and revised edition of "The Commercial Travelers' Guide to Latin America" has just been brought out by the Bureau of Foreign and Domestic Commerce at Washington, the changes having greatly increased its usefulness and having brought it up to date in line with the development that has occurred throughout these Spanish and Portuguese countries since the publication of the first edition.

This book, the author of which is Ernst B. Filsinger, should be considered as a standard work of reference for everyone having commercial relations with any part of Latin-America. The new edition not only has been improved materially by the addition of complete and detailed maps, but also its listing of cities and towns of commercial importance is of an enlarged scope. This listing is so thorough that exporters can use it with full confidence in planning distribution and sales campaigns, knowing that all places of commercial importance are given a correct listing.

The book itself runs to 700 pages, the most of which is devoted to information concerning each of the countries, their cities, etc. Another section of great value deals with general and detailed information for salesmen who are planning trips to any of the countries south of the Rio Grande.

In the publication of such comprehensive works as this, the Bureau of Foreign and Domestic Commerce is rendering a service that should be recognized by every exporter and it is to be hoped that other sections of the world will be surveyed in a like manner with the same scope and the same authority.

This book is sold for \$1.25 and may be purchased directly from the Bureau or its offices or, perhaps preferably for the automotive industry, through the Automotive Division of the Bureau.

* * *

WE have mentioned several books which have come to our attention dealing with phases of stores and material control. One of the most recent of these deals with the procurement and handling of material from the initial order until the finished product leaves the factory.

"Stores and Materials Control" by Madison Cartmell outlines purchasing, storekeeping and production procedure from the viewpoint of the production executive. Materials control in both small and large plants are dealt with, for as the author states, the only safe policy for the small plant to hold its own these days is to adapt the methods which have proved successful in the large plant. The work is copiously illustrated with reproductions of forms employed in proper materials control.

We do think that Cartmell failed to bring out one point

strongly when writing of the knowledge that the intelligent purchasing agent should have at his finger tips. He mentions that the purchasing agent should come in contact with department heads and that the engineering department should be consulted freely, but he does not emphasize the fact that only by close co-operation with these persons can the purchasing agent do full justice to his position.

The plant which is run to-day without department heads and purchasing agent getting around the same table and thrashing out problems does not function as it should and in the long run the fault will become evident.

* * *

A HISTORY of malleable cast iron has recently been published which deals with the theoretical as well as the practical side of the art of its production. H. A. Schwartz, the author, has outlined a great amount of experimental work which has been carried on and has made an effort to bring together in one volume much material which has appeared previously in scattered form.

As a source book for general information or knowledge of a more specific nature for those readers interested in malleable cast iron in any phase, this work should prove valuable. "American Malleable Cast Iron" is published by the Penton Publishing Co., Cleveland.

* * *

AFTER having been through twenty-five editions and impressions, each succeeding one supplying additional up-to-date information, Dyke's Automobile & Gasoline Engine Encyclopedia has appeared in its thirteenth edition, entirely rewritten from beginning to end.

While there is advantage in having information in this supplementary form, the changes in engineering design and manufacturing practice lead to so many insertions that the volume was beginning to get a little difficult to handle. The new edition entirely removes these troubles. Every subject is covered under its own head and properly indexed so that it can be found instantly.

The book was compiled with three classes of readers in mind, the student, repairman and owner. The first part contains chapters of detailed information on the operation and principles of various units such as the engine, carbureter, electrical equipment, etc. Several chapters take up the operation and care of the car and the latter part of the book is devoted to the subject of automobile repairing and adjusting.

Commercial vehicles, tractors, farm lighting plants, motorcycles and airplane engines are given attention under their own headings. A special chapter is devoted to the Model T Ford car, its principles, operation and repair. The new edition may be obtained from the U. P. C. Book Co., 239 West Thirty-Ninth Street, New York City.

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1923

THE automotive industry has just finished one of its most successful years. It faces 1923 optimistically, with the flush of good health on its cheeks. Having reached manhood, it is prepared to go forward with greater force and more discretion than ever before. It achieved many sensational things during its boyhood; the growing conservatism of young manhood will result in sounder and more enduring accomplishment.

There is every prospect for a profitable year in 1923. Passenger-car production should nearly equal that of 1922, while truck production may even rise a little. Inventories are well balanced in general, there has been no rapid expansion of factory space, marketing problems are being studied more carefully than ever before, and more attention is being given to dealer relationships. These are all favorable signs.

Many problems, which are too familiar to need re-

peating, still face manufacturers. But automotive executives are ready to meet these difficulties with constructive effort.

Because of the many good omens to be found as 1923 begins AUTOMOTIVE INDUSTRIES wishes the industry a Happy New Year with entire confidence that the wish will come true.

Make the Shows Timely

THE value of automobile shows might be increased materially if each one was planned with a specific idea as a basis. The exhibitors could agree beforehand as to some general idea around which the selling efforts of the show should be built. Then the show publicity, decorations, sales talks and individual exhibits could be directed toward putting over that idea.

The idea selected in each case should be timely and specially adapted to the immediate economic and selling conditions surrounding the particular exhibition. This would eliminate the danger of a certain type of show running one year and then simply carrying on along the same lines year after year merely through habit.

A prominent sales manager recently criticized, for instance, the very successful closed car show held in New York early this fall. He contended that the demand for closed cars was already far in excess of any possible supply, that dealers could not hope to make deliveries on such models, and that they simply made conditions worse for themselves and their factories by emphasizing the closed car at that time.

He asserted that what was really needed was an open car show. The fact that a closed car show was a good thing the year before did not mean that it would be equally good this year.

The closed car exhibit illustrates admirably how an automobile show can be built around a single general idea, individual exhibitors being left to their own devices in working out specific applications of the idea. Granting that the idea of interesting the public especially in closed models was a good one, the basic plan of the show was excellent.

The discussion as to the proper dates for the New York and Chicago shows has brought into prominence the possibility of building each show around a given idea. The purpose of the shows will be the determining factor in deciding the dates upon which they should be held.

If the N. A. C. C. members would each year decide upon some one general idea to be used as a dominant note in the big shows, they might materially influence the trend of car sales to their own advantage.

Suppose, for example, that the demand for closed cars cannot be supplied at the present time but that there are on hand stocks of open cars more readily available. The immediate ends of the industry might be well served if it was agreed to make open-car sales a dominant note in the New York and Chicago shows. Publicity and exhibits could feature methods of making the open car comfortable for winter use and special advantages of open models. This

would not necessitate any "knocking" of the closed car, but simply a temporary shift of selling emphasis to meet immediate production conditions.

In similar manner, new ideas could be developed for expression at shows in forthcoming years. Each special show idea would have to be considered, of course, in relation to permanent policies. Such a plan would have the double advantage of serving the practical needs of the industry and of freshening up the shows each year. Dealer associations throughout the country could be urged by manufacturers to adopt similar plans in connection with the various local shows which are held annually.

Sound Advice for Truck Interests

WHILE alleging that highway transport has reached its present proportions "by main strength and awkwardness" it finally has been accepted in the best society by the publication in the *Saturday Evening Post* of an article on "Our New Transportation System," written by Forrest Crissey. After reading it we had a lingering impression that the tone was rather apologetic for the reason that the writer recognizes the fact that the railroads don't look upon highway transport as a little friend and playmate.

Crissey seems to feel that while motor trucks have their good points, they haven't the best of manners and have been a bit too pugnacious in their relations with the older carriers. He uses most of his space in telling how they could be used to advantage in helping the railroads. Special emphasis has been placed on the possibility of cutting down terminal charges by means of store door delivery. It's a good point, but the automotive industry has been using the same arguments for a long time.

Donald D. Conn, who drafted the transportation section of the report of the Joint Congressional Commission on Agricultural Inquiry is quoted as having said:

"The motor truck interests are awakening to the facts that they are facing the general enactment of rate regulation and taxation legislation and that their only protection along these lines lies in getting together the vital facts which would be involved as a fair basis for this law-making. This, I am assured, is now being done. This is a research job which should be prosecuted with an eye single to getting the facts—not to making a case. The nation cannot afford to have this new facile and highly flexible form of transportation handicapped by unsound regulation."

This is sound advice. Motor truck interests certainly should know the exact facts for presentation to State legislatures. They should have a definite program. Arguments which are not solidly founded carry little weight. In this connection Crissey says:

"It would appear that the motor truck owners would do well to assume that increased fees, taxation and regulation are likely to demand their attention in the near future and that if they are to get a square deal they must know the facts upon which to fight for it."

Motor trucks may or may not get a square deal, for the railroads are stronger politically, but they

can come much nearer to getting it if they supply themselves with a reasonable amount of ammunition.

Even though Crissey's article may stress a bit unduly the arguments of the railroads, he has presented some constructive ideas for which the industry should be grateful.

Future Automotive Production

THERE has been a general impression that the specialized machine tool development of the last fifteen years has tended toward the development of machine-men; that there might come a time when the machine would be so perfect that human skill and ability would be unnecessary.

There is undoubtedly a basis for this impression. But the prediction as to the future must be viewed with more care than the analysis of the past. Recent observations indicate that there is a very definite limit to which specialization profitably may be carried. Man will continue to build machines for his own use, but will not be dominated by the machine.

The necessity for human skill is already retarding the increase in specialization in automotive production. A. J. Baker of the Willys-Overland Co. pointed this out clearly at the S. A. E. production meeting in Detroit several months ago. Discussing some disadvantages of the single-purpose tool, Baker showed that such tools require special skill on the part of set-up men and on the part of maintenance men. He said that the difficulty of repairing these machines made it very hard to obtain repair men sufficiently skilled to handle the task. He pointed out, of course, other major disadvantages of over-specialization in tool equipment, but the point cited bears most directly on the present discussion.

Maximum production efficiency will not be obtained by an attempt to "eliminate the human element." It is to be found in more intensive development of the full potentialities of human skill and ability on the part of the worker and in properly fitting that skill into the mechanical development of the industry.

The machine tool has brought tremendous benefits to civilization. Nowhere have those benefits been more apparent than in the automotive industry. Greater strides in mechanical production will be made in the future, many of them along lines already mapped out. But gains in production efficiency from now on will depend more than ever upon the ability of manufacturing men to correlate and adjust mechanical developments with the training and mental growth of individual workers.

THE National Association of Manufacturers has recommended that the immigration law be so amended as to permit the Secretary of Labor to admit immigration from any country in excess of its quota when a labor shortage exists. Proposals of this kind should be examined carefully as regards their permanent as well as their temporary effect. The immediate needs of American industry constitute only one of the many factors involved in a solution of the immigration problem.

Industry Opens Year at Quick Pace

January Schedules Exceed Last Month

Are Far Better Than Those of
Year Ago—March to See
Capacity Operations

DETROIT, Jan. 2—The industry is opening the year 1923 with the greatest production schedules it ever has known at this season. After brief closings during holiday week for inventories, factories are tuning up preparatory to entering upon the heavy manufacturing schedules for this year. January schedules, though not representing capacity operations in any plant, are heavier than December, and are far in excess of operations at this time a year ago.

Schedules in almost all plants are from 20 to 40 per cent in excess of last year's totals and so far as manufacturing alone is concerned there are ample facilities to meet the increases. Dealer organizations have been strengthened greatly by the big companies, but their gains have been largely at the expense of smaller companies.

Increase to Be Gradual

As a general rule, operations in all plants during January will run at about 60 to 70 per cent of the anticipated volume in the spring and summer months. Totals will be stepped up gradually until by March capacity operation should be in swing. Much of the early shipping will be preparatory to the opening of spring business, but large demand in practically all parts of the country has kept stocking to a much lower figure than customary.

There is no stocking of closed cars; on the contrary factories are behind on orders for cars in this class. Body deliveries are better and are improving all the time, but demand continues to exceed supply. Factories which have developed sport and special models find that they have been important factors in keeping alive an open body business during the winter. Continued demand for sport models, however, would interfere seriously with large production later.

Ford retail sales in the United States again will exceed 100,000 in December, and January business will be equally heavy. Production totals will tally closely with this figure and is low in comparison with earlier months in the year because of the heavy closed car business. The new Chicago plant of the

Business in Brief

NEW YORK, Jan. 4—Despite the holiday week there was more than usual activity in trade and industry and the new year was ushered in under very favorable auspices. The usual period of quiet given over to weighing the past, examining year-end inventories and the like saw abnormal activity in many lines with buying very strong and higher price levels maintained.

The iron and steel industry reports postponement of the customary plant shutdowns. Orders for cars and railroad equipment continue to flow in. Pig iron prices developed strength. Furnace coke advanced \$1 and foundry coke 50 cents a ton. Prevailing coke prices are about \$5 above those of a year ago.

Building materials are in great demand. Brick manufacturers are sold ahead for many months and refusing further orders. Textiles also gained, cotton rising to the highest point of the season, 27 cents. A decrease in lumber output for the week ending Dec. 23, due to weather conditions and the holiday, was noted.

Car loadings for the week ending Dec. 16 aggregated 888,082, an excess over the same week of the two previous years, but a decrease of 31,746 from the week of Dec. 9 due to the seasonal decline. Shortage of cars still persists, particularly in the grain sections, but the situation is improving.

Soft coal output has declined since the second week of December. The causes for this decline are not yet apparent. Acute supply conditions in the anthracite trade continue.

Rain and snow have provided a much needed supply of water for irrigation so that the outlook for the winter wheat crop has improved. The domestic wheat market is in a firm position while exports are disappointing.

Ford company is designed principally to speed closed car output.

Chevrolet is at capacity of its present plants and is shipping from 1200 to 1500 cars daily. With the completion of its new plants early in the year, the company will have capacity for 2500

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Plants in Readiness for New Year Start

Manufacturers Use Inventory
Period in Efforts to Meet
Back Orders

NEW YORK, Jan. 2—The inventory period in the majority of plants in the industry will come to an end this week with far less than the usual interruption in manufacturing activities. Pressure of orders has made continued operations necessary in many factories, with an actual shut-down taking place only toward the end of the month, and then for but two or three days.

This has enabled manufacturers to take steps toward catching up on back orders and to avail themselves of the improvement in the closed body situation. Top-speed operation at body plants has been of material aid to car builders, but despite the improvement that has come, the body shortage is still a serious problem which will not be solved completely until additional facilities now being provided are available.

Rounds Out Surprising Year

Owing to the necessary curtailment of production programs the latter part of the month, December output will show a falling off from that of November, but reports indicate that the decline will not assume large proportions and will not interfere with the original estimate of 2,500,000 cars and trucks for the year. In establishing a record for that month the industry rounds out a year of surprises.

Buying interest carried over the Christmas season in unprecedented volume and will receive a fresh stimulus from the announcement of new models at the New York show. While some manufacturers have prepared schedules for 1923 many have waited to shape their programs until the show season was launched and inventory taking cleared away.

Rail movements have shown some improvement, thus effecting a prompter delivery of finished products and making unnecessary as extensive a use of motor trucks as formerly in shipping materials from producing centers to automobile manufacturing

(Continued on page 47)

Akron Increases Prices of Tires

Most Makers Follow Action of Goodrich

Firestone States It Will Sit Tight —Goodyear to Announce Its Policy Later

AKRON, OHIO, Jan. 2—The long expected break in the tire price situation in the Akron producing district came on Saturday, Dec. 30, when the B. F. Goodrich Co. put price advances ranging from 10 to 15 per cent into immediate effect, following the lead taken outside of the Akron area by the Fisk, Kelly-Springfield and United States Tire & Rubber companies.

Practically all other tire-producing companies in the Akron center followed the Goodrich lead with the two major exceptions of the Firestone Tire & Rubber Co., and the Goodyear Tire & Rubber Co.

Goodyear refrained from making any announcement until after Jan. 2, although admittedly it is planning to advance prices commensurately with the Goodrich increases. Firestone officials reiterate the statement of President Harvey Firestone made at the stockholders' annual meeting the middle of December that "We have no intention of increasing prices in the immediate future." Officials of major competitive companies, however, predict that Firestone will capitulate before long.

Companies Announce New Lists

Vice-President G. M. Stadlerman of Goodyear, when informed of the Goodrich action, merely said, "We have no announcement to make now."

The General Tire & Rubber Co., Miller Rubber Co., Mohawk Rubber Co., American Hard Rubber Co., Seiberling Rubber Co., Star Rubber Co. and the Marathon Co. all announced increases commensurate with those of Goodrich, but did not announce dates when the new prices would become effective. All, however, said the new lists would be ready for enforcement of the new schedules by Jan. 3 or 4.

The India Tire & Rubber Co. increased prices from 12 to 14 per cent, effective Dec. 30, and the Swinehart Tire-Rubber Co. also put an average 12½ per cent increase into effect the same day.

The Mason Tire & Rubber Co. of Kent, which advanced tire prices 5 per cent on Nov. 15, announced that a second advance, ranging from 9 to 12 per cent,

Improved Industrial Conditions Point to Big Year in 1923 for the Automotive Industry

By COLIN CAMPBELL,

General Sales Manager of the Chevrolet Motor Co.

Detroit, December 30.

THE year 1923 is set to be the biggest and best year the automotive industry has ever known because of the economic condition of the country. There is more money in the banks than for a number of years and the ratio of deposits to loans is such as to permit of largely increased business for companies whose product and prices are right.

In practically every section there has been a vast improvement in conditions. The industrial districts are continuing to buy automobiles in heavy volume, with demand improving in some districts such as the steel and coal producing areas. The farmer is not only coming into the market in 1923 but he is in it now and has already begun to take cars in considerable volume.

Fair prices for their product have enabled farmers to clear off their bank indebtedness in most cases and many farmers already have money to spend. The banks will be ready to loan to the farmer in the spring on his prospective crops of the year and this will give him a chance to rehabilitate himself. With the farmer back in the market, the industrial section of the country is assured of much better business and this prosperity will in return mean better prices for the farmer later.

Export business is improving but, with 85 per cent of everything we produce required for our own needs, the foreign market is not essential to good business here. We have demonstrated that the United States is a self sustaining nation and that all the elements for business success are contained within our own borders.

The most important business requirement is to keep money in circulation and there is now and will be in 1923 plenty of money changing hands. Conditions on the Pacific coast are especially good. In the Southwest the sugar beet growers have had good crops. Texas and Oklahoma oil fields are in full operation. Cattle raisers have been meeting obstacles but are overcoming them. Wheat crops and prices have been good and though there is still quite some corn in the cribs it is moving more freely.

In the South, cotton prices have brought prosperity to most States together with good tobacco crops and other products. New England has not recovered from its industrial trouble but New York, Pennsylvania and other industrial States in the East and Great Lakes districts are busy. In every large city there is a tremendous boom in building operations and this will continue for some time.

Automobile buyers have come to appreciate the fact that lowered prices for new cars have meant consequent declines in the value of the cars they have been operating and many who have been unwilling to trade in cars at fair prices will do so now. There is no used car problem in the low priced car field and dealers in other lines have learned that there is no problem in selling a used car that has been accepted at its true value. Stocks of used cars about the country will now melt like snow when the spring buying begins.

Dealers must prepare to take advantage of the business in the new year by getting cars now while they can be obtained.

would become effective Jan. 15.

The Goodrich increases range from 10 to 15 per cent, averaging about 12½ per cent, on all lines of automobile tires. Prices are to be advanced on pneumatic and solid truck tires also.

"We will increase tire prices from 10 to 15 per cent, but we cannot now commit ourselves as to exactly when the new schedules will become operative. It will probably be a few days after New

Year's," said Sales Manager F. C. Milhoff of the Miller Rubber Co.

"We are ready to fall into line as soon as we can draft our new schedules," announced Vice-President William O'Neill of the General Tire & Rubber Co.

"Our advances of from 12 to 14 per cent go into effect as of Dec. 30. We are seven weeks behind orders and turning out 575 tires and 800 tubes a day.

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G.M.C. Reorganizing Brown-Lipe-Chapin

**Plant Will Be Expanded and
Force Increased to Provide
Greater Output**

SYRACUSE, Jan. 2—Reorganization of the Brown-Lipe-Chapin Co. of this city as the Brown-Lipe-Chapin Division of the General Motors is now under way, following the announcement that the General Motors has purchased a controlling interest. It is reported that General Motors paid between \$5,000,000 and \$10,000,000.

H. Winfield Chapin, former secretary, treasurer and general manager of the concern, becomes president of the new division. Samuel H. Cook, a former vice-president is made a vice-president. Thomas L. Merrill of Detroit, a director of General Motors, becomes secretary while M. L. Pransky of Detroit, treasurer of General Motors, holds that position in the new concern. These men and John L. Pratt of New York, now head of the accessory division of General Motors, make up the board of directors.

The reorganization now under way includes expansion of the plant and increased production. The firm has been employing 2200 men but this number will be augmented to approximately 4000 within the next few months.

Rolls-Royce Planning to Add to Its Force

SPRINGFIELD, MASS., Jan. 2—Rolls-Royce, which is about \$750,000 behind on orders, shortly will increase its force, which now approximates 800, at the chassis and body plants here. Little difficulty is experienced, officials say, in maintaining the supply of materials needed for continuous production.

The company is now operating close to capacity, with a night shift working in the machining department. Denial is given to a report that the company is contemplating moving its works to the Middle West.

Wilson Foundry Shortens Inventory Taking Period

PONTIAC, MICH., Jan. 2—The Wilson Foundry & Machine Co., producing engines for Willys-Overland, Inc., was compelled to reduce its two weeks' inventory period to two days in order to keep going on the project of establishing a reserve of engines and parts before entering on its 1923 schedule.

The new Knight engine shop has started on a schedule of 150 to 175 engines a day, which was the capacity of the plant a few months ago, before rearrangements were made with a view to obtaining a production of 300 daily.

OUTPUT IN NOVEMBER AGGREGATED 235,854

WASHINGTON, Jan. 2—Reports from the Department of Commerce through the Bureau of Census, in co-operation with the National Automobile Chamber of Commerce, show total production of cars and trucks for November of last year to be 235,854.

With a few exceptions, the reports each month as shown in the following table are from identical firms and include approximately 90 passenger car and 80 truck manufacturers:

Passenger Cars		
	1922	1921
July	224,770	165,574
August	248,484	167,705
September ..	187,964	144,669
October	216,467	134,734
November ...	214,631	106,042
Trucks		
July	21,739	10,766
August	24,394	13,080
September ..	19,130	13,648
October	21,434	12,813
November ..	21,223	10,010

D. R. Wilson, general manager, has been building up the personnel in the foundry and machine shop to take care of a rush of business which he declares bids fair to run steadily through the year.

"A scarcity of labor in many lines is already developing," Wilson says. "We have been bringing in skilled men for some time. Our working forces have been increased several hundred men in the past few weeks to handle the schedule with which we start the new year."

Production at Hendee Plant Is Nearly Normal

SPRINGFIELD, MASS., Jan. 2—Production at the Hendee Manufacturing Co.'s plant is reported as nearly normal, with schedules calling for an output of 20,000 cycles in 1923. The motorcycle industry has been stimulated by the increased employment of young men who are the natural customers for the product, and by the enlarged use of the motorcycle for commercial and police use, according to General Manager Frank J. Weschler.

A nationwide sales drive has been instituted in the interest of the medium weight machine, the Indian Scout. Reports from distributors in attendance at the Olympic Show in London are said to encourage the belief in an increased export trade for Indian machines during the coming year.

IRA FRY KILLED

EAST MOLINE, ILL., Dec. 29—Ira Fry, chief tester for the R & V Motor Co., was killed Dec. 26 in a road accident.

Kulas Selected Head of Parish & Bingham

**Mrs. Agnes D. Morse Will Con-
tinue to Serve Company in
Official Capacity**

CLEVELAND, Jan. 2—Mrs. Agnes D. Morse of this city, for many years president of the Parish & Bingham Co. and one of the few women in the United States to operate a large factory, has resigned from the presidency of the corporation and has been succeeded by E. J. Kulas of Crouse, Tremaine, Kulas Co., investment bankers.

Three weeks ago Mrs. Morse requested Kulas to become interested in the management of the corporation. Mrs. Morse will continue with the company in an official capacity.

Kulas stated that the present board of directors—S. J. Wainwright and H. C. Sherrard of Pittsburgh; Mrs. Morse, George A. Coulton, senior vice-president of the Union Trust Co., and C. S. Eaton, a member of the firm of Otis & Co.—has been increased by the addition of himself and Frank H. Ginn of the law firm of Tolles, Hogsett, Ginn & Morley.

Kulas With General Electric

For fifteen years Kulas was associated with the General Electric Co., devoting the last five years of that time to building up run-down properties.

Mrs. Morse for years has been a notable figure in local manufacturing circles. In her regime at the plant of the Parish & Bingham Co., the business of the company increased from \$200,000 to \$9,000,000 yearly, the peak having been reached in 1920. She became the active head of the institution on the death of her husband. Eighteen years ago B. G. Tremaine, a business partner of Kulas, sold a half interest in the corporation to Mrs. Morse's husband for \$36,000. That half interest today is worth many times that amount.

The Parish & Bingham Co. dates back to 1894, when it was organized under a West Virginia charter. It was reorganized under Ohio laws in December 1911 with an authorized capitalization of \$1,000,000, of which \$244,000 was outstanding. It was again reorganized in July, 1919, with capital of 150,000 shares of no par stock. The new corporation acquired the entire outstanding capital of \$823,000 of the old company.

Excellent 1922 Business

The company manufactures automobile bodies and other automobile equipment. It is a large producer of Ford motor frames, and it passed through 1922 with a volume of business that compares favorably to what was done in other years. It is expected that with the working out of certain financial plans to be announced later, the company will enjoy a greater volume of business in 1923.

Parts Sales in 1922 May Be Half Billion

November Business Aggregated
\$36,616,850, According to
Reports of Makers

NEW YORK, Jan. 2—Equipment purchases during November showed a slight falling off from those of October, according to reports received from members of the Motor and Accessory Manufacturers Association. This decrease is not at all alarming, the parts makers reporting that sales are keeping up at a record clip and that the new year looks good.

With a business amounting to \$36,616,850 in November, the parts concerns have sold \$384,226,070 worth of equipment for the first eleven months of 1922, which is \$150,524,508 in excess of the business done in the same period of 1921. It is predicted that for the full twelve months the parts and accessory business will total considerably more than \$400,000,000 and not so very far from the half billion mark.

November business fell off 5.51 per cent from October, but October had showed an increase of 3.90 per cent over September, which slumped 13.36 per cent over its predecessor.

Collections were slower in November than in October, the past due notes increasing 22.58 per cent, which is about on a par with September. Notes show 6.16 per cent decrease which is about the same report October filed in this department.

Saxon May Continue Manufacture of Cars

DETROIT, Jan. 2—There will be no exhibits of Saxon cars at the National shows this year, according to David C. Bayne, secretary and treasurer of the Saxon Motor Car Co., who was named receiver following the filing of bankruptcy petitions. Preparations are being made for the sale of the company as soon as a favorable opportunity presents and there is a possibility that the company will continue as a car manufacturing concern.

Harry L. Bill, vice-president and general manager of the company, who has resigned to become general manager of Owen-Dyneto, is working with Bayne in winding up the affairs of the company. James S. Becker, formerly sales manager of the company, has joined the Hudson-Essex distributing organization in Atlanta as general manager.

OLDS HAS NEW AXLE PLANT

DETROIT, Dec. 29—Olds Motor Works has given over a new plant at its works in Lansing for the manufacture of axles exclusively. Equipment at present will permit of the manufacture of 400 front and 400 rear axles a day. Room has been allowed for expansion so that a

M. A. M. A. MEMBERS REPORT \$384,226,070 TOTAL SALES FOR ELEVEN MONTHS OF YEAR JUST ENDED

NEW YORK, Jan. 3—Reports from members of the Motor and Accessory Manufacturers Association show that sales in November 1922, decreased 5.51 per cent over the preceding month and that for the first 11 months of 1922 the total sales amounted to \$384,226,070, or \$150,524,508 more than for the corresponding period of 1921.

The following table shows the sales by members of the association, the total past due accounts and the total of notes held for all the months of 1921 and the first 11 months of 1922:

1921	Total Sales	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	\$6,264,587		\$8,099,727		\$4,359,871	
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,069,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc.	4,358,545	.22 Inc.	3,677,500	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3,463,500	5.82 Dec.
November	18,998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc.
December	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec.
1922						
January	17,320,000	20.61 Inc.	4,450,000	5.45 Inc.	3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.07 Inc.	3,000,000	2.00 Inc.	2,500,000	1.05 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.05 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5.00 Dec.
July	41,001,670	2.42 Dec.	3,423,850	20.42 Inc.	2,217,670	4.49 Dec.
August	43,700,000	5.00 Inc.	3,705,000	8.21 Inc.	2,398,350	8.15 Inc.
September	37,300,050	13.36 Dec.	4,220,400	13.91 Inc.	2,658,800	10.86 Inc.
October	38,753,800	3.90 Inc.	3,463,850	17.93 Dec.	2,603,100	2.09 Dec.
November	36,616,850	5.51 Dec.	4,245,850	22.58 Inc.	2,442,700	6.16 Dec.

total of 1600 front and rear members daily can be made at any time the demand requires.

The plant is laid out on the progressive assembly plan with individual motors for each machine, line shafts and overhead pulleys being entirely eliminated.

New Financing Company Is Formed in Washington

WASHINGTON, Jan. 2—The Automotive Finance Co. has been formed here with a capitalization of \$1,000,000 for the purpose of specializing in automobile paper. The stock will be subscribed largely by automobile concerns, whose affiliation with the organization will enable them to secure funds for the discounting of automobile paper thus permitting more liberal terms to automobile buyers and giving prospective customers additional incentive to buy.

MICHIGAN FORGE ACTIVE

PONTIAC, MICH., Jan. 3 — The Michigan Drop Forge Co. has orders ahead which will call for steady employment at capacity of the day force for several months, according to B. F. Esgar, its president. Esgar reports business prospects excellent among the parts manufacturers and states that the company has booked large orders for wheel forgings.

Will Not Allow Bus to Parallel Railway

WASHINGTON, Jan. 2—Motor bus transportation cannot compete on parallel lines with street railway transportation, according to the Public Utilities Commission, in passing on the application of a local company for permission to establish a new bus line which would compete with a street railway.

The public can best be served by making bus transportation an adjunct to street railway transportation and not by competing with it, the commission ruled, in denying the application.

The position of the commission is summed up as follows:

The commission has announced the policy regarding the establishment of motor bus lines and holds that the legitimate field for bus service does not lie in the multiplication of bus lines or automotive vehicles but rather in providing service in the extension of street car lines into territory so thinly settled as not to justify the large investment necessary for street railway service.

FORD BRANCH TAKES STOCK

MILWAUKEE, Jan. 2—The Milwaukee assembling plant of the Ford Motor Co. is closed down only one week this year for inventory, the recess having started Dec. 30. Operations will be resumed Jan. 8 on a 100 per cent capacity basis, according to orders received by H. M. Buckley, general manager.

Milwaukee Expands as New Year Breaks

District Shows Activity in New Buildings and Plans for Greater Output

MILWAUKEE, Jan. 2—Resumption of activity today after the holiday recess marks the beginning of one of the most important periods of expansion that the automotive industries in Milwaukee and Wisconsin have ever experienced. While the present week continues to witness a reduced production schedule in many shops pending the completion of inventories, events are occurring which far overshadow the temporary and customary lull.

So far as the Milwaukee district is concerned, the chief event is the practical completion of the new works of the LaFayette Motors Corp. and the beginning of the transfer of the equipment and stock of the original plant in Indianapolis to Milwaukee. The main building, 200 x 1000 ft., adjoins the four-cylinder car division of the Nash Motors Co. The LaFayette operating organization began to mobilize today.

Nash Plant Progresses

An event of practically equal importance is the progress of work on additions to the Nash four-cylinder works at this point, which means the starting of equipment work that within a short time will increase the present capacity 100 per cent.

At Janesville, Wis., 70 miles southwest of Milwaukee, this day marks the commencement of initial production operations in a large new branch works of the Chevrolet Motors Co. and the virtual completion, ready for equipment installation, of a new unit of the Fisher Body division.

The Chevrolet plant occupies the extensive works built at Janesville in the last three years for the Samson Tractor division of General Motors, and an addition costing \$100,000 which provides the necessary facilities to put the former tractor works into a position of greatest efficiency for passenger car assembling by the continuous or progressive system of production. The new Fisher body plant cost \$300,000 and is expected to be ready to start operations late in January.

Kissel Using Addition

At Hartford, Wis., forty miles north of Milwaukee, the Kissel Motor Car Co. today begins to make use of remodeled and enlarged works, including a new power plant which cost \$175,000 or more. This work is the forerunner of building and equipment activities covering another six months to a year, by which Kissel will make available greatly enlarged facilities for manufacturing passenger cars as well as trucks.

Within a few weeks the second unit of the Seaman Body Corp. plant at Mil-

NEW YORK REGISTERS 1,007,617 VEHICLES

ALBANY, N. Y., Jan. 2—A 20 per cent increase in motor vehicle registration for 1922 is reported by the State Tax Commission, which bases its estimate as of Dec. 14, within two weeks of the end of the fiscal year.

At that time 1,007,617 motor vehicles had been registered with grand total receipts of \$12,705,064. This compares with a registration of 819,223 and receipts of \$10,464,698 in 1921.

The number of passenger cars registered in 1922 jumped from 630,883 in 1921 to 779,616; buses from 32,687 to 35,120, and commercial vehicles from 148,668 to 185,359. Trailers increased from 3213 to 3408. Dealer registrations jumped from 3872 to 4114. The total fees on all classes of cars shows an increase from \$9,124,024 to \$11,085,052.

In New York City registrations to Dec. 1 showed 216,516 passenger cars, 17,069 buses, 67,397 trucks and 993 trailers.

waukee, increasing the present output 100 per cent, will be ready to go into production. The additional investment will be between \$750,000 and \$900,000 by a duplication of the original works erected within the past three years at a cost at that time of nearly \$1,250,000. The Seaman company is affiliated with Nash and LaFayette and specializes in inclosed bodies.

The foregoing is a recital of only the major events in a series of happenings which in conjunction with the enlargement going on in the already enormous automotive parts industry of Milwaukee marks a new epoch in the expansion of the passenger car and motor truck industries of the metropolis of Wisconsin, made possible and based on the phenomenal strides made by passenger vehicle business in 1922, and the entry of 1923 by the automotive industries with more actual business booked and prospects better than in any past year in the history of the trade.

REO IN SOUTH AMERICA

DETROIT, Jan. 2—The Reo Motor Car Co. has established trade connections in Buenos Aires and Rio de Janeiro and is sending forward shipments of cars and speed wagons. Speed wagon business in South America is reported brisk in the past 30 days.

The company notes a development of a system of motor buses for the carrying of children to schools in the larger cities of the Latin countries. Buses are reported as also being used to a large extent in the cities for extending and developing the routes of the electric railway lines.

General Tire Sales Reached \$7,600,000

Gross Revenue Exceeded 1921 by \$1,750,000 Despite Reductions Made in Prices

AKRON, Jan. 3—The year just closed was the most prosperous in the history of the General Tire & Rubber Co., according to reports of officers submitted at the annual meeting of stockholders.

While most tire producing companies reported gross sales revenues for 1922 considerably less than those of 1921, due to the fact that tire prices were reduced nearly 40 per cent during the year, the General Tire had so large an increase in unit production that, despite the diminished revenues from tires sales, it was able to report total sales revenue more than \$1,750,000 in excess of those of 1921. General's 1921 sales aggregated \$5,846,912. Sales for the fiscal year ending Nov. 30 are reported as approximately \$7,600,000.

The company reports net earnings of \$1,060,554 and shows current assets and current liabilities in ratio of approximately 16 to 1.

Stockholders of the company will participate in a 100 per cent stock dividend, it is officially announced. Although the stock dividend was decided upon by directors last November, the action was not disclosed until the annual meeting. The company will continue its regular quarterly dividends on both preferred and common stock.

The General company is manufacturing about 2500 tires daily and shortly after the first of the year will nearly double production, now completing three new factory buildings. Salesmen have been notified to prepare to double their 1922 business in 1923.

The company's balance sheet includes, among the assets, \$223,022 cash on hand and in banks; accounts receivable, \$1,122,102, and notes receivable, \$531,365. The liabilities include accounts payable, including payrolls, \$169,981; reserve for taxes, \$58,151, and surplus, \$1,121,739.

Plan for Wheel Merger Waits on Stockholders

DETROIT, Jan. 2—Negotiations for the purchase of the Imperial Wheel Co. by the Hayes Wheel Co. are practically complete but awaiting the confirmation of stockholders of both companies and the completion of inventory of the Imperial.

Imperial manufactures about 1200 sets of wheels daily, principally for Buick, Chevrolet and Dodge Brothers. The stock of the company is held by Flint resident, C. S. Mott, General Motors vice-president, being a large stockholder. Under Hayes control the plant probably will be extended to care for all Flint business of the merged companies.

27.8 Per Cent Output Was in Closed Cars

Indications Are That the Figure
Will Be Exceeded During
Present Year

NEW YORK, Jan. 2—A detailed survey of those companies making 98.9 per cent of the passenger cars produced in 1922, made by AUTOMOTIVE INDUSTRIES, shows that 27.8 per cent of the total output last year was closed cars. There is every reason to believe that this is the most accurate figure obtainable.

All signs point to this percentage figure being broken this year, for it is undisputable that if the car manufacturers had been able to get enough closed bodies to meet the demand this percentage would have been much higher.

There is every evidence that the car makers have made their plans to meet this extraordinary demand this year. General Motors and Fisher Body are well organized for this effort, and Fisher is operating more than thirty factories besides just completing a huge building in Detroit which gives an additional 1,000,000 feet of space for body building requirements. Fisher also is completing a new plant at Janesville, Wis., in which Chevrolet bodies will be built. In fact, every Chevrolet plant will have a body building annex in order to meet the demand.

Durant Expanding Activities

Durant also is expanding his body building activities. He is interested in the recently formed Hayes company which will have plants at Elizabeth, Flint and several other places, while Mengel of Louisville will be another that will contribute its quota to Durant's needs. Ford is planning a \$6,000,000 plant at Chicago, which will be given up largely to body building, while Studebaker, which is rapidly completing several new plants, has taken good care to arrange for plenty of room for body building.

Among the manufacturers of the higher priced cars closed bodies naturally have the call and here the percentage is much greater. Cadillac and Packard run as high as 75 per cent, while Hudson and Essex, which were pioneers in the development of the low priced closed body, are running in the neighborhood of 50 per cent closed.

NEW YEAR STARTS IN PERU

LIMA, PERU, Nov. 30 (by mail)—Dec. 1 marks the beginning of the new automobile year in Peru. It finds the automotive dealers here thinking as much in terms of fleets of cars or trucks as of single installations. They are dealing with individuals or companies who buy five cars or more or who operate fleets of buses.

The new automotive year also finds

N. A. C. C. Estimates That the Output of Cars and Trucks in 1922 Represents a Value \$30,000,000 Greater Than the Production of the Previous Year

NEW YORK, Jan. 2—The wholesale value of the estimated production of 2,527,000 motor vehicles in 1922 is nearly \$30,000,000 greater than that of the 1921 volume, according to Alfred Reeves, general manager of the National Automobile Chamber of Commerce, who has compiled "Facts and Figures" of the automobile industry for the year just ended.

The volume of business done in cars and trucks in 1922 amounted to \$1,558,567,000 in wholesale values as compared with \$1,260,000,000 in 1921. The estimated retail average price of the passenger car in 1922 was \$770 as compared with \$900 in 1921.

The following table gives important data relative to the industry during the past year:

PRODUCTION		Industry		30%
Cars and trucks.....	2,527,000	Per cent of aluminum supply used by automobile industry		20%
Cars	2,287,000	Per cent of iron and steel supply used by automobile industry		4%
Trucks	240,000	Number of doctors using motor cars.....	110,000	
Previous record motor vehicle production (1920).....	2,205,000	Number of motor cars owned by corporations...	600,000	
Number of new cars needed for replacements in 1923...	1,800,000	Gasoline consumption (U. S.) 1922 (gals.).....	5,300,000,000	
Production of closed cars...	35%	Average monthly surplus of gasoline (gals.).....	784,261,000	
Total wholesale value of cars and trucks.....	\$1,558,567,000	Gasoline consumption (U. S.) 1921 (gals.).....	4,506,706,000	
Total wholesale value of cars	\$1,374,487,000	Per cent of cars used more or less for business.....		90%
Total wholesale value of trucks	\$184,080,000	Per cent of total car mileage used entirely for business		60%
Total wholesale value of cars and trucks 1921.....	\$1,260,000,000	MOTOR BUS AND MOTOR TRUCK FACTS		
Estimated average retail price of car 1921.....	\$900	Number of cities using bus lines	108	
Estimated average retail price of car 1922.....	\$770	Number of motor buses in use	40,000	
Reduction in average retail price of car.....	14%	Number of schools using motor buses.....	12,000	
Estimated average retail price of truck 1921.....	\$1,326	Number of street railways using motor buses.....	56	
Estimated average retail price of truck 1922.....	\$1,050	Number of railroads using motor vehicles on short lines	40	
Reduction in average retail price of truck.....	21%	Number of motor express lines in U. S.....	1,500	
Tire production.....	36,340,000	Farm products hauled by motor transport annually (tons)	134,400,000	
Number of persons employed in motor vehicle and allied lines	2,431,400	Freight hauled annually by motor trucks (tons).....	1,430,000,000	
REGISTRATION		EXPORTS		
Motor vehicles registered in U. S. (approx.).....	11,500,000	Value of motor vehicles and parts exported (including engines and tires)...	\$123,742,000	
Motor cars.....	10,250,000	Number of motor cars exported	66,000	
Motor trucks.....	1,250,000	Number of motor trucks exported	10,000	
Increase in U. S. registration over last year.....	7%	Value of motor cars exported	\$52,125,000	
World registration of motor vehicles	12,750,000	Value of motor trucks exported	\$8,381,000	
Per cent of world registration owned by U. S. A....	81%	MOTOR VEHICLE RETAIL BUSINESS IN U. S.		
Motor vehicle registration on farms	3,500,000	Passenger car dealers.....	38,000	
Motor cars.....	3,300,000	Motor truck dealers.....	25,000	
Motor trucks.....	200,000	Public garages.....	48,000	
Motor cars serving suburban communities.....	780,000	Service stations and repair shops	63,000	
Passengers carried annually by motor car.....	7,500,000,000	Supply stores.....	63,700	
AUTOMOBILE'S RELATION TO OTHER BUSINESS				
Number of carloads of automobile freight shipped by railroad	400,000			
Per cent of rubber supply used by automobile industry	83%			
Per cent of plate glass supply used by automobile				

dealers beginning to import new models. Old stocks for the most part are a thing of the past and the new models are arousing great enthusiasm. The higher prices for the chief Peruvian exports—cotton, sugar, etc.—mean better business in this country for 1923.

BUICK SETS NEW RECORD

DETROIT, Jan. 2—All previous records for production of automobiles by the Buick Motor Co. were exceeded on Dec. 28 when the Buick plants at Flint and Detroit built 825 automobiles.

Companies Announce Many New Models of Cars

Jackson, Dixie Flyer Will Be Discontinued

Associated Motors, Changing Name to National, Will Build a \$795 Car

CHICAGO, Dec. 30—At a meeting of stockholders yesterday, at which plans were made to announce at the New York show a six-cylinder car selling for \$795, it was voted to change the name of the Associated Motor Industries to the National Motors Corp.

This is the merger incorporated in Delaware more than a year ago for \$80,000,000, the completion of which was announced last July when eight companies, including the National Motor Car & Vehicle Corp., the Kentucky Wagon Co., the Traffic Truck Corp. and Jackson Motors Corp., were acquired.

It was announced at yesterday's meeting that hereafter all the passenger cars made by the new corporation will go under the name "National." Small stocks on hand of Jackson and Dixie Flyer cars will be sold at a sacrifice, and these makes will be discontinued, according to T. C. Brandle, vice-president in charge of merchandising. The new line of National cars now ready for announcement includes nine models in three size groups. It was emphasized by Brandle that these are entirely new cars and are in no way related to the old National which was made by the former National Motor Car & Vehicle Corp. of Indianapolis.

Leading the new line at a revolutionary price is the National 6-31 to sell at \$795 for the five-passenger phaeton. The only other model ready in this group is the sedan, which will be priced between \$1,000 and \$1,100. This car is to be powered with a six-cylinder National engine made in the corporation's own plant. Most of the other units will be

manufactured by the corporation, and the car will be assembled at the Louisville plant of the Kentucky Wagon Co., where formerly the Dixie Flyer was made. It will have a 112 in. wheelbase.

The production schedule for 1923 is 30,000 cars of this type.

The second group is called the 6-51, and the five-passenger phaeton will sell at \$1,485. It is powered with a six-cylinder Continental 8-R engine. The wheelbase is 121 in. It will include a number of standard units not made in the corporation's plants. It is announced in three models, the phaeton, sedan and coupe. This car is to be assembled at the plant of the Jackson Motors Corp., Jackson, Mich. The production schedule for 1923 is 7000 cars.

The third line is the 6-71, the seven-passenger phaeton to sell at \$2,485. This car will have a six-cylinder National engine. The wheelbase will be 131 in. The four models announced are the seven-passenger phaeton, five passenger sport, sedan and close-coupled sedan. This car is to be produced at the plant of the National Motor Car & Vehicle Corp. at Indianapolis. The production schedule for 1923 is 5000 cars.

Holbrook Body Engineer

The bodies of all these models have been designed by H. F. Holbrook, who has been retained by the corporation as its body engineer.

The corporation also will manufacture the Traffic truck in the St. Louis plant of the Traffic Truck Corp. A schedule of 13,000 trucks for 1923 has been approved. In addition to directing the merchandising activities of the National Motors Corp., Brandle will continue as manager of the Traffic Truck plant. He formerly was vice-president and general manager of the Traffic corporation.

W. Ohmer, formerly president of the Recording & Computing Machines Co. of Dayton, continues as chairman of the board of the National corporation. First vice-president is A. A. Gloetzner, for-

(Continued on next page)

H.C.S. Produces New Six-Cylinder Model

Phaeton Is Priced at \$2,650—Resembles Four-Cylinder in Appearance

INDIANAPOLIS, Jan. 3—The H. C. S. Motor Car Co. announces a new six-cylinder chassis which will be displayed for the first time at the New York Show. The price of the phaeton model is \$2,650. The present four-cylinder line will be continued. Prices on the roadster and phaeton models, however, have been reduced from \$2,475 to \$2,250.

The engine is a six-cylinder Midwest with 3½-in. bore and 5-in. stroke. Delco starting, lighting and ignition, Willard battery and Stromberg carbureter are regular equipment. Cooling water is circulated by pump. The fan is a two-bladed aeroplane type of cast aluminum and is driven by a V-belt.

The clutch and gearset are a unit with the engine. The former is a dry disk type. The gearset is a three speed Brown-Lipe with aluminum case. There is an auxiliary shaft connecting the gearset and the propeller shaft. This feature eliminates all possible misalignment of parts. The rear axle is three-quarter floating with spiral bevel gears. Both brakes are internal expanding and operate on the rear wheels.

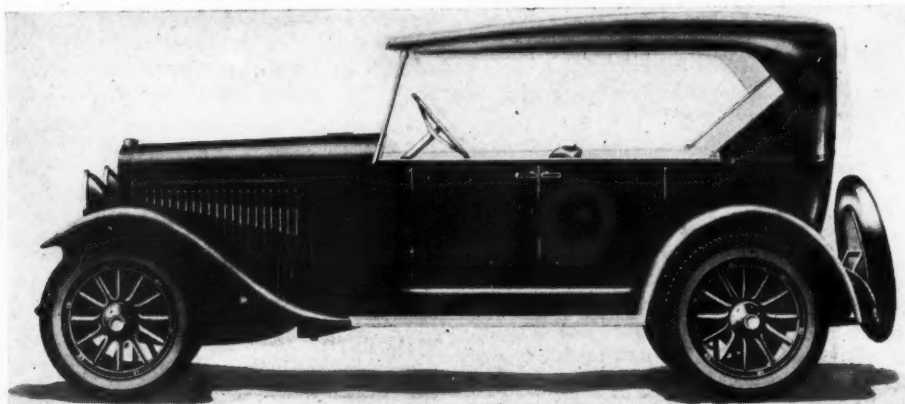
Wire wheels are regular equipment but disk may be had at no extra cost. Two spare wheels are carried, one on each side forward of the door to the front seat.

Wheelbase Is Longer

The wheelbase of the new model is 126 in., which is six inches longer than the four cylinder model. Semi-elliptic springs are used, front and rear, the front springs being 2½ x 36 in. and the rear 2½ x 56 in. The gasoline tank is located at the rear and has a capacity of 18 gal. Fuel is fed forward to the carbureter by air pressure.

Color options of blue, gray or carmine are offered and special paint work may be obtained on order. Upholstery is hand-buffed leather in shades to match paint. All door frames are one-piece malleable castings. The instrument board is of walnut with nickel trimmings. The windshield is a one-piece ventilating type with nickel alloy supports. Regular equipment includes nickel silver headlights, spotlight, tail light, motometer, gasoline gage, electric horn, windshield cleaner and Gabriel snubbers.

From the standpoint of appearance, the new model bears considerable resemblance to the present four-cylinder phaeton.



The new National six-cylinder lists at \$795 and is the lowest priced six-cylinder on the market. In addition there are two other National sizes

To Be Given First Public Showing at New York

Stutz Now Entering Six-Cylinder Field

Moderate Priced Car Will Be
Equipped with Company's
Special Engine

INDIANAPOLIS, Jan. 3—The Stutz Motor Car Co., which in the past has built only four-cylinder models, has added a moderate priced six-cylinder car of which the details have just been announced.

This new model will be equipped with the Stutz Special engine of 3 $\frac{3}{4}$ -in. bore by 5-in. stroke, which gives it a piston displacement of 268 cu. in. As regards output, it is claimed that at 3200 r.p.m. the engine delivers more than 70 hp. Cylinders and upper half of the crankcase are cast in a block. The front end drive is by silent chain.

The carburetor is a Stutz-Stromberg and the electrical equipment is Stutz-Remy. Fuel feed is by the vacuum system. Lubrication is by force feed to all bearings. The cooling system comprises a centrifugal pump, propeller type fan and detachable core radiator.

The clutch and transmission are of standard design. Left hand steering and center control are used. The steering column has an 18-in. hand wheel with corrugated black walnut rim, and on top of this is a spark and throttle control of the friction type. A 7-in. frame channel is used and the frame is of very rigid design, with tubular and other cross members. The body is supported on the frame at ten points.

Rear Axle Semi-Floating

The rear axle is of the semi-floating, pressed steel housing type with spiral bevel gear drive. The bearings in the rear axle and in the front wheels are of the roller type. A feature of note is the large size of the brakes, the service brakes being 15 $\frac{1}{2}$ in. by 2 $\frac{1}{4}$ in. and the internal emergency brakes 15 $\frac{1}{4}$ by 2 in.

The springs are semi-elliptic all around and it is worthy of note that with a wheelbase of 120 in. the total spring length on each side is 100 in., the rear springs being 62 in. and the front springs 38 in. long. Twelve spoke artillery wheels with 32 by 4-in cord tires are standard equipment, but wire and disk wheels will be furnished at an extra charge if desired. On the sedan the tire equipment is 33 by 4 $\frac{1}{2}$ in.

For the present three models will be built, a roadster, a phaeton and a sedan. The price has not yet been set, but for the open car it will be between \$1,800 and \$2,000. Following is a list of the equipment going with the car: Moto-Meter, 75 mile-per-hour speedometer, oil

pressure gage, ammeter, two instrument board lights, electric motor driven horn, head lamps with universal mounting for quick and easy adjustment to meet legal requirements, light diffusing lenses, gasoline gage, shock absorbers all around, set of tools and tire carrier.

(Continued on page 46)

Jackson and Dixie Flyer Are to Be Discontinued

(Continued from preceding page)

merly president of the Covert Gear Co. Other officers are: vice-president in charge of the Louisville division, R. V. Board, formerly president of the Kentucky Wagon Manufacturing Co.; vice-president in charge of the Indianapolis division, George M. Dickson, formerly president of the National Motor Car & Vehicle Corp.; vice-president, W. W. Sterling, formerly vice-president of Jackson Motors Corp.; vice-president and chief engineer, C. L. Hallaway, formerly general manager of the Jackson Motors Corp., and secretary and treasurer, Carl L. V. Exselsen.

\$1,145 Sport Roadster Added to Oakland Line

PONTIAC, MICH., Jan. 2—The Oakland Motor Car Co. has added to its line a sport roadster, which will be exhibited for the first time at the New York show. It is mounted on the standard chassis and is painted a light maroon upholstered in brown Spanish leather.

Disk wheels with demountable rims are used. The instrument board is walnut and glass covered and the instruments are silver faced. There is a leather bound khaki top and khaki covered windshield visor. This model is in addition to the regular roadster, which will be continued, and the sport touring. The new model sells for \$1,145 f.o.b. Pontiac.

Paige Big-Six Model Changed in Details

Adopts New Make of Clutch and
Gearset and Chain Front
End Drive

DETROIT, Jan. 2—The Paige big-six has been changed in a number of details and will now be known as model 6-70 instead of 6-66.

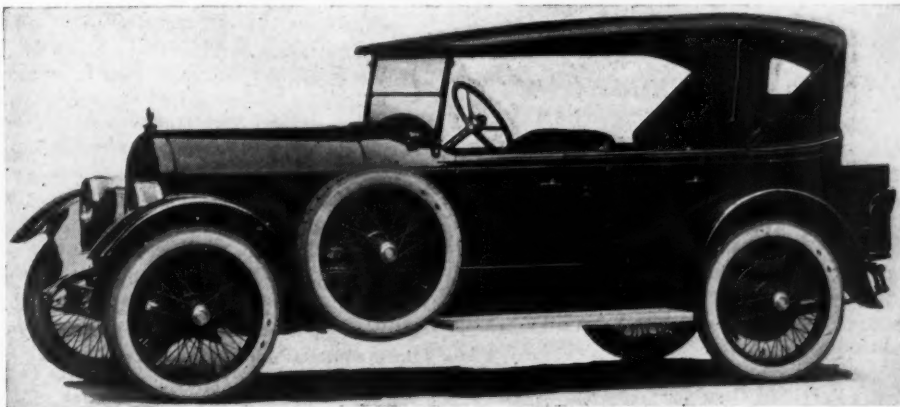
The more important mechanical changes include the adoption of the Link-Belt front end drive with automatic spring idler take-up; the Long clutch, new Warner gearset, Mechanic's Machine Co. propeller shaft and universal joint, Timken axles and a reinforced frame.

The Continental built, six-cylinder, L-head, 3 $\frac{3}{4}$ by 5 in. engine remains as before, with the exception of the chain front end drive. This is the chain with links on the back or reverse side which engage with the automatic idler providing the spring take-up for chain tension. This double sided chain provides a means for the automatic tension device and also increases the engagement of the chain on the sprockets.

The frame now has four cross members, a tubular one in front and a heavier pressed steel cross member at the center, the latter being made of $\frac{3}{4}$ in. instead of $\frac{1}{2}$ in. stock. The siderails are made of $\frac{3}{4}$ in. stock.

The most noticeable change in body outlines is in the five-passenger model, in which the rear end, instead of sloping forward toward the top, slopes backward, which has resulted in a gain in length of 5 in., all of which has been added to the rear compartment.

All of the cars now have nested coil upholstery springs and the open cars are upholstered in hand-buffed, bright finish, heavy leather. A five-passenger touring sedan has been added to the line.



The new six-cylinder Stutz which will be uncovered at the New York show will be a big production job to sell at \$1,995. The Stutz four will be retained as the higher priced line

Men of the Industry and What They Are Doing

Altree Visiting Europe

A. H. D. Altree, vice-president of the American Bosch Magneto Corp., Springfield, Mass., has sailed for England and Continental Europe, for the purpose of helping in stimulating sales at the company's foreign branches and agencies.

Peterson Succeeds Moreland

N. W. Peterson, former cashier in Pontiac banks, has become assistant treasurer of the Wilson Foundry & Machine Co., taking the place of D. J. Moreland, who has retired.

Joseph H. McDuffee Resigns

Joseph H. McDuffee has resigned as assistant general manager of the Cole Motor Car Co., effective Jan. 1. McDuffee long has been identified with the industry, first with the Stanley steamer, later as Stoddard-Dayton dealer in Chicago fifteen years ago and after that with concerns such as Stearns-Knight and Willys-Overland. He has not announced his plans for the future.

H. S. Welch Sails for Europe

H. S. Welch of the export department of the Studebaker Corp. of America has sailed from New York on a trip to Europe in the interest of Studebaker business. He will go first to the Continent, visiting a large part of it, and return by way of England, the trip requiring two or three months.

Emerson Goes with Durant

Jay R. Emerson has resigned as purchasing agent of the King Motor Car Co., a position he has held for nine years, and will become purchasing agent of Durant Motors at Muncie, Ind. His resignation with King is effective Jan. 12.

H. V. Welles Joins Agency

H. V. Welles, sales manager of the Detroit Gear & Machine Co. for the past six years, has resigned to become secretary and treasurer of the Willey, Detroit, advertising agency.

Tollzien With Spring Perch

Clarence F. Tollzien, for a long term of years identified with the Packard Motor Car Co. in Detroit, has associated himself with the Spring Perch Co. of Bridgeport, Conn., manufacturer of automobile springs. He will serve as the company's exclusive representative for the States of Michigan and Ohio and will maintain offices in the General Motors Building of Detroit.

Pettit is Goodyear Branch Head

Bert M. Pettit, formerly of Racine and Kenosha, Wis., and widely known in the automotive industries, has been appointed

manager of the Milwaukee branch of the Goodyear Tire & Rubber Co. He is a graduate of the University of Chicago and Massachusetts Institute of Technology. For several years he served as advertising manager of the J. I. Case T. M. Co., Racine, later going to the J. I. Case Plow Works Co. as advertising and sales manager and secretary of the Wallis Tractor Co. Four years ago he joined the Goodyear organization as manager of the Goodyear Farm Bureau, pioneering its unique promotion of motor truck use on farms. Later he was made manager of the pneumatic truck tire department at Akron and then given general supervision of truck tire sales and general dealer distribution.

S. A. E. Names Bowman Vice-Chairman

C. C. Bowman, chief engineer of the Standard Motor Truck Co., Detroit, has been appointed vice-chairman of the frames division of the Society of Automotive Engineers. He has been serving on the division during the past year and has given considerable time and study to the frame problem. The division is now cooperating with the truck and frame manufacturers to adopt standard size frames for the various capacities and types of trucks. Considerable progress has already been made by this committee during the past year.

E. D. Emmons Resigns

E. D. Emmons, sales manager of the Hayes Manufacturing Co., Detroit, has tendered his resignation to take effect Feb. 1 after a connection of 16 years with the Hayes organization. He has not made definite plans for the future.

Lavine Gear Appoints Friend

Otis C. Friend, for many years president of the Mitchell Motor Car Co. at Racine, and later general manager of United Motors, has become identified with the Lavine Gear Co., formerly of Racine, now located in Milwaukee. He will be directly in charge of passenger car sales, and for the time being will operate out of the Milwaukee office. When both the Lavine Gear Co. and the Mitchell Motor Car Co. were operated in Racine, a marked intimacy developed between Friend and Herman A. Uihlein, president of the gear company. Friend's joining forces with Uihlein is a more or less natural outcome of that association.

King Joins Transport Truck

R. B. King has joined the Transport Truck Co. of Mount Pleasant, Mich. He will spend part of the time at the Transport general offices and part among the Transport's distributing organization. For four years King was identified with the Republic Motor Sales Corp. as sales promotion manager and eastern division sales manager.

Stahl Succeeded by Bennett

James A. Bennett, who has been connected with the company for several years, has been appointed sales manager of the Connecticut Telephone & Electric Co., Inc., to succeed C. E. Stahl.

U. S. Ball Bearing Promotes Monk

Marvin E. Monk has been appointed director of sales for the U. S. Ball Bearing Manufacturing Co., Chicago, manufacturer and distributor of ball bearings. Monk for some time past has been assistant sales manager of the company.

Henry M. Holt Promoted

Henry M. Holt has been made manager of the Brooklyn branch of Willys-Overland, Inc., taking up his duties the first of the year. Holt has been a member of the New York Overland sales department for the past three months and previous to that has been service manager of the New York branch. He has been with Overland branches in different cities for the past six years. He has been active in service association work, having been president of the New York association for the past year.

Advertising Managers Select Meeting Dates

NEW YORK, Dec. 31—Advertising managers allied with companies which are members of the National Automobile Chamber of Commerce and the Motor and Accessory Manufacturers Association have scheduled meetings during Chicago show week.

The N. A. C. C. will hold a two day session, Jan. 29-30, with the meetings probably at the University Club. The sessions will be presided over by Chairman E. S. Jordan and the topics for discussion will be selected by ballot, each advertising manager having been asked to name a topic he would like to hear talked on.

The Advertising Managers Council of the M. A. M. A. will hold its meeting Jan. 31. Chairman Ezra W. Clark announces the central theme of the conference to be: "How Can the Parts and Accessory Manufacturers Assist in the Development of the 'Fully Equipped Car' and Truck Market?"

CHICAGO SALON EXHIBITORS

CHICAGO, Jan. 2—Space reservations for the Chicago Salon to be held at the Drake Jan. 27 to Feb. 3, inclusive, include the Benz, Cadillac, Cunningham, Daniels, Duesenberg, Isotta Fraschini, Itala, LaFayette, Leon Rubay, Lincoln, Locomobile, Marmon, Minerva, Packard, Rolls-Royce and Winton. Fleetwood, Kimball and de Causse have arranged for special custom coach exhibits.

Court Makes Ruling on Trade Body Work

Judge in New York Sets Forth
Activities That He Dis-
countenances

NEW YORK, Jan. 4—Federal Judge Knox has handed down a consent decree restraining the Gypsum Industries Association, its officers and members, from doing anything in violation of the Sherman anti-trust law. At the same time Judge Knox named certain specific things in the interest of the industry which are not against the interest of the public.

While this decision may affect some of the industries, prominent members of the automobile industry feel that the decision in none of its points touches the automotive world or its associations. This feeling particularly applies to the National Automobile Chamber of Commerce and the Motor and Accessory Manufacturers Association. Still, they say, the decision interests them in showing what may be done.

As pointed out by United States Attorney Hayward, the decree discourages the existence of a trade association as such because of the many opportunities afforded at the regular meeting of the association for price fixing, curtailment of production, division of territory and other abuses devised illicitly, either formally or informally, at these regular meetings.

Feature Court Favors

The decree favors the organization of a non-profit making corporation for the general welfare of the members with its powers clearly and definitely defined in its charter, those powers being limited expressly to things that are clearly lawful and that will not cut corners in the effort to circumvent the Sherman law, says Hayward.

Among the prohibited acts are: Agreeing to fix prices for gypsum products, maintain uniform prices, agreeing to advance or decrease prices; agreeing to communicate with one another as to proposed advances or decreases in prices; agreeing to limit or control the output for the manufacture or the manufacturers; agreeing as to distribution of territory or in favor of or against any mail order house, cooperative buying association or dealer; agreeing to blacklist; agreeing to fix middlemen's discount to consumer; agreeing to adopt or follow any published list price, etc.

DUPONT G. M. HOLDINGS BIG

NEW YORK, Jan. 3—Wall Street reports that figures just announced in the financial district show that the E. I. duPont de Nemours & Co. and the duPont family hold approximately 50 per cent of the entire outstanding capital common stock of General Motors Corp. Between the corporation and the family it is said the holdings consist of about

10,000,000 shares out of a total of 20,645,990 outstanding. Of this the duPont family is credited with holding 1,500,000 shares, the duPont company 7,512,176, Nobel Industries 809,425, Canadian Explosives 258,234 and Chevrolet Motor Co. 25,781. All these are friendly to the duPont interests.

Akron Follows Goodrich with Higher Tire Prices

(Continued from page 37)

Business never was better and the outlook for 1923 never was brighter," stated E. A. Grubb, sales manager of the India Tire & Rubber Co.

"We are running at normal production of 800 tires daily. Our increases in prices date from Dec. 30," announced Thomas Walsh of the Swinehart Co.

"Business is increasing. Prospects are increasingly bright. We are working on new price lists and will have them ready early next week," said Sales Manager I. R. Bailey of the Seiberling Rubber Co.

"We are just closing the biggest year in our history and look for a bigger year in 1923. Production is running 500 casings a day. Our new prices go into effect about Jan. 3 or 4," announced President L. H. Firey of the Star Rubber Co.

"We will increase prices about 12½ per cent early next week. Business could not be better. Spring orders are unusually heavy, and we now are running 600 tires daily," stated officials of the Marathon Co.

A general advance in the tube prices also is expected. Goodrich increased tube prices 10 to 15 per cent three weeks ago.

Hupmobile Prices Lowered on Open and Closed Cars

DETROIT, Dec. 30—Reductions in prices of the Hupmobile models, ranging from \$35 to \$110, effective Jan. 1, are announced by the Hupp Motor Car Corp. The standard and special roadsters and phaetons are reduced \$35, bringing the standard models to \$1,115 and the specials to \$1,215. The sedan is reduced from \$1,785 to \$1,675. A new two-passenger coupe is to sell for \$1,385. The four-passenger coupe is now \$1,535.

The new prices are based upon the company's anticipated increase in production in 1923 to 40,000 cars.

Littleton Named Speaker at Banquet of N. A. C. C.

NEW YORK, Jan. 2—Martin W. Littleton, one of New York's most noted lawyers, will be the chief speaker at the annual banquet of the National Automobile Chamber of Commerce at the Commodore Hotel Tuesday night. His subject will be "Where Will the Government Stop?" It is expected that his speech will deal with the government of business by the Federal authorities.

The other speaker will be Will Rogers, cowboy comedian, whose topic will be "What I Think of the Automobile."

Company Forming to Acquire Premier

Receivership Expected to End
Any Day—Title Will Pass
to Committee

CLEVELAND, Jan. 3—Letters received here by creditors of the Premier Motor Corp. of Indianapolis give the information that the friendly receivership of the Premier is likely to end any day and title to the property and assets will be passed to a reorganization committee, by whom the property will be transferred to a new corporation which is in process of formation.

Creditors here are authority for the statement that Frank S. Stratton, formerly sales manager for Grant, president of the Automotive Distributors, Inc., of New York, is responsible largely for the reorganization of the Premier.

While details of the plans of the company that will take over the property were not announced, it was learned that the company will exhibit at the New York and Chicago shows a small, low-priced car of new design and employing a reversed cantilever spring suspension.

Four Models in Line

There will be four models in the line—two closed and two open. The sedan will list at \$985 and the open car at \$595. The car will be powered with a four cylinder engine and the wheelbase will be 102 in.

The creditors' letter states that the new company will be capitalized for \$2,000,000 of preferred stock and 500,000 shares of no par common stock. A bond issue of \$900,000 also has been authorized. The assets of the company exceed \$3,000,000. The plant is modern and has 300,000 sq. ft. of manufacturing floor space, located on 34 acres of land which the company owns.

Despite the receivership, public confidence in the car and the future of the company was widened by a volume of sales, unusual under the circumstances, which were made at regular list prices. This public confidence had the effect of holding the company's dealer organization intact, and the company will resume with an outlet for its maximum scheduled production for the first six months, fully assured.

New Merchandising Method

The letter refers to a new method of merchandising, which materially reduces the cost of distribution and saves to the car buyer from 10 to 20 per cent of the normal cost of automobiles when marketed by methods which have been in vogue heretofore.

It is stated by creditors here in accord with the proposal whereby the friendly receivership will end that already sufficient creditors of Premier have consented to put the deal through. The next step is to get the approval of the proper court authority at Indianapolis.

Toledo Will Require More Skilled Labor

**Demand for 25,000 Mechanics
Due to Expansion of Indus-
try in That City**

TOLEDO, Dec. 30—Toledo is looking forward to a big year in the automotive industry here.

Employment managers at a recent meeting stated that there would be a demand for approximately 25,000 skilled mechanics the first two months of the new year. As practically all of the plants have been operating above normal for this season, this indicates a large increase in the production of automotive products.

The Willys-Overland Co. plans to produce 45,000 cars the first quarter and to have approximately 15,000 men at work by April 1.

The Toledo Chevrolet Co. is building an addition to its plant. Bock Bearing Co. reports enlarged demand for its products with orders for February delivery increasing over January.

Electric Auto-Lite expects to increase its force by several hundred after it gets under way Jan. 2, following two weeks' period for inventory. Nearly a 30 per cent increase in employment is contemplated.

The Tillotson Carburetor Co. has the largest production schedule in its history marked out for 1923.

Ford Plate Glass Co., which does considerable business for automobile companies, is remodeling one of its plants and preparing for a big increase in windshield business.

Industry Opens Year with Good Schedules

(Continued from page 36)

cars daily. This includes both superior and copper-cooled lines.

Buick is building from 650 to 750 daily in all plants, Studebaker 500 to 600, Dodge about 600, Hudson-Essex approximately 250, Maxwell-Chalmers about 200, Paige-Jewett about 150 daily and Hupp is operating at about the same capacity. Oakland, Oldsmobile, Reo and Dort are building about 100 cars daily.

In the better priced cars, Cadillac is operating in excess of 100 daily. Packard is increasing its production and soon will be operating close to the 100 daily mark. Wills Sainte Claire is preparing to resume production on a large scale, but probably will not be able to enter upon its bigger program until after Feb. 1. In the meantime the company is operating strictly on a sales basis. Roamer is getting into production on its light six models and is meeting fair business on its larger product.

Production of the Star car at the Lansing plant of Durant Motors is increasing steadily and now is close to the 200

daily mark. Production will be increased to a minimum of 300 daily, a figure that represents the capacity of the new Star plant at Flint when it gets into operation early in the summer. Durant four models are running at the rate of 50 to 100 daily.

Rickenbacker is increasing its production to the 50 daily mark and will exceed this figure as the season progresses. Columbia is building from 50 to 75 daily. Earl is starting on its 1923 schedule and soon will be building about 50 daily. Gray is building in excess of 100 cars daily and is planning to increase to about 200 daily at once.

Stutz Has Six-Cylinder; Conference with Schwab

(Continued from page 43)

NEW YORK, Jan. 4—The new six-cylinder Stutz, which will make its debut at the show, will list at \$1,995 for the phaeton and roadster and \$2,550 for the five-passenger sedan. The prices were set at a conference of Stutz officials held last night at the New York residence of Charles M. Schwab, which was attended by Eugene V. R. Thayer, chairman of the Stutz board of directors, and Carl Schmidtlapp, vice-president of the Chase National Bank of New York, both of them Schwab's associates; W. M. Thompson, president and general manager of Stutz; Fred Wilson, sales manager, and Herbert Hyman, advertising manager.

Output Schedule Set

In addition to setting the list on the six-cylinder, the conference also discussed production, the decision being to set the mark for 1923 at 10,000, of which about 8000 will be sixes. Inasmuch as 1200 four-cylinder jobs were sold in 1922, it was thought that 2000 can be sold this year.

No changes in prices on the four-cylinder will be made, but a new model has been added, or rather an old one revived—the Bulldog, a four-passenger de luxe open car which will sell for \$3,115. The remainder of the Speedway Four series will list as follows: Phaeton, \$2,640; roadster, \$2,450; standard sportster, \$2,790; Bearcat de luxe speedster, \$2,765, and four-passenger coupé, \$3,490.

Reo Motor Will Exhibit New Four-Door Brougham

DETROIT, Jan. 3—Reo Motor Car Co. will show a new five-passenger four-door brougham at the shows this year, the price of which will be considerably lower than the company's other closed models. The new car will be finished in two colors, deep maroon and deep gray.

Equipment includes heater, truck, ventilator, sunshade, windshield wiper, disc wheels, bumpers, motometer, special carburetor with thermostatic control and new type of air heater for cold weather driving, stop and signal lights and aluminum kick plates.

New Car to Be Built by D. McCall White

**James Scripps Booth Identified
with Him—Strong Backing
Is Reported**

DETROIT, Jan. 3—D. McCall White, formerly associated with LaFayette Motors Co. and Cadillac Motor Car Co., and at present conducting a consulting engineering office in this city, will shortly bring out an entirely new car. The name of James Scripps Booth, known in the industry as an engineer and an authority on body design, is linked with the project.

Details of construction and specifications are closely guarded by the company organized to manufacture the car, but it is known that the product will represent an effort to put on the market a car of exceptionally low weight, of the highest quality at a moderate price.

It is stated the engine will be an entirely new silent, high efficiency type, covered by patents held by White. Strong financial support by Detroit capitalists is claimed for the organization.

Chandler Will Exhibit "Pike's Peak" Engine

NEW YORK, Jan. 2—The Chandler Motor Car Co. plans to announce its new engine at the New York show on Saturday. In addition, the company will show several new body styles and announces some chassis refinements.

The Pike's Peak engine, as it is called, is cast in a single block with a removable head. The crankshaft has been materially increased in size, and the number of crankshaft bearings increased to four.

In the way of bodies the company will show the two-door chummy sedan, brought out late in the fall. It seats five passengers, and entrance to the rear compartment is possible because of the front seats tilting. Exteriorly it looks like the larger sedans, while the rear is fitted with aluminum body bars and a trunk rack.

Other bodies include the Royal Dispatch, a four-passenger sport model; five and seven-passenger phaetons, a four-passenger roadster on a new chassis, the Metropolitan and seven-passenger sedans and the limousine.

RYAN FEDERAL CONTRACT SOLD

NEW YORK, Jan. 2—Allan A. Ryan's contract to purchase the Federal Motor Co. of Indianapolis for \$110,000 on which \$10,000 had been paid before he went into bankruptcy has been sold to the Willys-Overland Co. for \$2,000 on petition of attorneys representing the trustee of the estate. No reason is given for the Overland bid. Under the terms of the contract Overland will have to pay \$102,000 for the Federal plant.

J. R. Lee Withdraws from Wills Company

Conforms with Reorganization
Plan Being Worked Out by
Banking Interests

DETROIT, Jan. 3—John R. Lee has withdrawn voluntarily from all interest in the C. H. Wills & Co. enterprises at Marysville. For the present he will not make any statement as to anticipated future activities. With his withdrawal, practically the entire original set of officers of the Marysville company, with the exception of C. H. Wills, has gone. The list includes Kirk B. Alexander and Charles Morgan, who, with Lee, were also vice-presidents in charge of departments.

Confirming the Lee withdrawal, Wills said: "In the process of reorganization work now going on, Mr. Lee has voluntarily made the decision to withdraw from all of the C. H. Wills & Co. enterprises. Mr. Lee's decision to take this step has not changed in any way our relations toward each other, these being, let me say, most cordial and friendly."

Commenting further on the Lee resignation, Wills said that it was not incidental to the receivership, but was permanent and was to conform with the plan of reorganization of the company which is being worked out by banking interests. This, he said, would probably result in the conclusion of the receivership without the sale of the company. No new officers will be named until the receivership is concluded.

In addition to the changes in the present line of cars, two new models have been added, which will be shown for the first time at the New York and Chicago shows. The prices on the new models will conform with those of the present line. Work on the appraisal of the plant and property of the company is still in progress, but will be concluded this week.

Plants in Readiness for New Year Start

(Continued from page 36)

zones. The generally mild winter has been of substantial benefit to the traffic end of the industry.

This month will find a greater movement of open cars to dealers in anticipation of spring demand. Such shipping facilities as have been available in the last few months have been used for the most part to send closed models forward, with the result that there has been little stocking up of either closed or open cars. Plant operations, also, have been centering around the closed model in view of its unexpectedly sudden leap to popularity.

An active demand for the lighter duty truck is reported, with a pros-

Program Completed for Meetings, Luncheons and Dinners to Be Held During the Week of the National Shows in New York and Chicago

NEW YORK, Jan. 2—Events taking place during the national show weeks in New York and Chicago are announced as follows:

NEW YORK

Jan. 6-13—National Automobile Show, Grand Central Palace.
Jan. 8-13—Automobile Body Builders' Association Show, Twelfth Regiment Armory.
Jan. 9-12—Society of Automotive Engineers' Annual Meeting.

Jan. 8

10:00 A.M.—National Automobile Chamber of Commerce Export Manufacturers' Convention.

Cadillac Motor Car Co. of Detroit, Headquarters all day at Hotel Astor.

6:30 P.M.—Rubber Association Dinner, Waldorf-Astoria.

Jan. 9

12:30 P.M.—Oakland Motor Car Co., Luncheon at Hotel Commodore.

12:30 P.M.—Cole Motor Car Co. of New York, Luncheon at Hotel Commodore.

6:30 P.M.—N. A. C. C. Annual Dinner, Hotel Commodore.

Jan. 10

10:00 A.M.—N. A. C. C. Directors' Meeting.

10:00 A.M.—Franklin Automobile Co.'s Sales Conference, Commodore, Luncheon 1:00 P. M.

10:00 A.M.—Motorcycle and Allied Trades Association Meeting at Astor.

Cadillac Motor Car Co. of Detroit, Headquarters all day at Astor.

12:00 Noon—Buick Motor Co., Luncheon and Meeting at Commodore.

2:00 P.M.—M. A. M. A. Meeting at Commodore.

Evening—Eastern Oldsmobile Dealers' Meeting, Dinner, Commodore.

6:00 P.M.—Oldsmobile Co. of New York, Dinner at Commodore.

7:00 P.M.—Motor and Accessory Manufacturers' Association, Dinner, Commodore.

Jan. 11

Hupmobile Luncheon and Dealers' Meeting, Commodore.

New York State Automobile Merchants' Association Luncheon and Meeting at Commodore.

1:00 P.M.—Willys-Overland, Luncheon at Commodore.

1:00 P.M.—Rickenbacker Motor Co., Luncheon at Commodore.

Special General Meeting, Truck Members, N. A. C. C.

6:30 P.M.—S. A. E. Dinner, Pennsylvania Hotel.

7:00 P.M.—Chevrolet Motor Co., Dinner at Commodore.

7:00 P.M.—Studebaker Corp. of America, Dinner at the Plaza.

7:30 P.M.—Palge-Detroit M. C. Co., Dinner and Entertainment at Commodore.

CHICAGO

Jan. 27-Feb. 3—National Automobile Show, Coliseum and First Regiment Armory.

Jan. 27-Feb. 3—Annual Automobile Salon, Drake Hotel.

Jan. 29-31—Automotive Electric Association's Annual Meeting, Congress.

Jan. 27

10:00 A.M.—National Automobile Dealers' Association's Directors' Meeting, LaSalle.

Jan. 29

10:00 A.M.—Sixth Annual Convention, N. A. D. A., LaSalle.

N. A. C. C. Advertising Managers' Conference.

8:00 P.M.—Annual Banquet, N. A. D. A., LaSalle.

Jan. 30

10:00 A.M.—Concluding Session, N. A. D. A., LaSalle.

N. A. C. C. Advertising Managers' Conference.

Jan. 31

10:00 A.M.—N. A. C. C. Directors' Meeting.

10:00 A.M.—N. A. D. A. Directors' Meeting, LaSalle.

10:00 A.M.—Franklin Automobile Co.'s Sales Conference, Congress, Luncheon 1:00 P.M.

M. A. M. A. Advertising Managers' Conference.

Evening—Central and Western Oldsmobile Dealers' Meeting, Dinner, LaSalle.

S. A. E. Meeting and Dinner, Congress.

Feb. 1

Hupmobile Luncheon and Dealers' Meeting, Congress.

pective increase in the sale of the heavier vehicle as the year advances. Due to the trend toward motor buses throughout the country, manufacture of this type of vehicle is playing an important part in the truck branch of the industry and makers show a growing disposition to arrange manufacturing programs to admit of their production in greater quantities.

NEW EQUIPMENT BODY

LOUISVILLE, KY., Dec. 30—Organization of the National Association of Manufacturers' Representatives, with the expectation that it later will become affiliated with the Automotive Equipment Association, has been undertaken, according to E. G. Schoen of Schoen Bros., Louisville, who is acting as commissioner of the organization.

Scope of Locomobile Unit Made Broader

Includes Full Control of Flint as
Well as That of New Mason
Road King

NEW YORK, Jan. 2.—The Locomobile Co. of America has taken title to the Durant plant in Long Island City and will operate it as the Flint Motor Co. division. The Durant Motor Co. of New York, which heretofore has operated the Long Island City plant, will be dissolved and its assets absorbed by the Durant Motor Co. of New Jersey.

The Long Island City plant was the first factory opened by Durant Motors, Inc. It was used chiefly for the production of Durant fours, but Stars also were manufactured there until operations were transferred to the Elizabeth plant. This factory will be used to supply Flints for the eastern market.

The Locomobile company will take the full production of Flints from the new Flint, Mich., plant for distribution in the central and western territories.

Mason Truck Included

The Mason Truck Co. also will be a division of the Locomobile company. Operations will be carried on in the Mason plant at Flint and also at the Old Riker truck plant at Bridgeport, Conn., from which the eastern market will be supplied. Truck production at the Flint plant will approximate 100 this month and it will gradually be expanded to 30 a day.

The Locomobile company has begun the construction of an addition to the main plant at Bridgeport, which is operating at capacity. Production facilities now are inadequate, and when the addition is complete it will be possible to eliminate overtime in several departments.

This move will make the Locomobile unit a most important cog in the Durant machine and also add another star to the Durant executive staff in the recognition of Col. E. H. Havens who will head this unit. Col. Havens was receiver for Locomobile and brought order out of chaos so successfully that W. C. Durant has recognized his ability by naming him vice-president in charge of operations of Locomobile, Flint and Mason.

Capitalization Increased

A certificate has been filed at Dover, Del., increasing the capital of Star Motors, Inc., from 1,000,000 shares of no par value to 2,000,000 shares of no par value. It is understood a large part of the proceeds of the sale of this stock will be devoted to the development of a national sales and service system.

The Elizabeth plant now is turning out 100 Stars daily and has gone into production on the Durant four. The sales department of the eastern division of the Durant enterprise has been

transferred from Long Island City to Elizabeth.

A special train will be run from New York Jan. 9 to take Durant distributors here for the show to Elizabeth for an inspection of the plant. The following day there will be a double celebration at the Elizabeth factory. It will mark the thirty-sixth anniversary of F. W. Hohensee's affiliation with W. C. Durant as well as the formal opening of the plant. W. C. Durant himself will take a large number of executives in his various companies to Elizabeth on a special train Jan. 11 for an inspection of the factory, and will entertain them at luncheon there.

FINANCIAL NOTES

Gisholt Machine Co., Madison, Wis., an extensive manufacturer of turret lathes and other metal-working tools, has amended its articles of incorporation to provide an increase in capitalization from \$1,250,000 to the equivalent of \$3,600,000. The new issue consists of 12,000 shares of preferred at \$100 and 24,000 shares of common without par value.

Seamless Steel Products Co., Milwaukee, has increased its authorized capitalization from \$100,000 to \$200,000, to accommodate the growth of the business and provide for future enlargement. E. J. Lansing is president and general manager.

Harvey Spring & Forging Co. of Racine, Wis., manufacturer of vehicle springs and forgings and specializing in both original and replacement equipment for passenger cars, has increased its capitalization from \$300,000 to \$700,000.

Packard Motor Car Co. has declared a dividend of 2 per cent or 20 cents a share quarterly on the increased common capital, payable Jan. 31. Recently the company paid a 100 per cent stock dividend.

Indiana Truck Corp. has declared a regular quarterly dividend No. 24 of 1½ per cent on the preferred stock payable Jan. 1, 1923, to stockholders of record Dec. 30, 1922.

Diners Told by Durant of Corporation's Future

NEW YORK, Jan. 2.—Officers of Durant Motors, Inc., and the Durant Corp., together with about fifty guests, were present at the first annual dinner of the Newark office of the Durant Corp. given in honor of W. C. Durant by John J. Bergen, district manager.

Carroll Downes, president of Star Motors, Inc., served as toastmaster. Durant spoke at some length on the phenomenal growth of the organization, giving credit to the corporation for its cooperation in making it possible. He outlined briefly the future of the corporation as an organization which may enable going concerns with able management and sterling product to secure financial assistance for expansion without paying a usurious sum to the banking fraternity.

Other speakers of the evening touched on the Durant plan of organization partnership.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Last week rates for loans on call covered a range of 4½ per cent to 6 per cent as compared with 4 per cent to 5 per cent in the preceding week. Because of end of the year requirements there was an increased demand for funds. In time money very few transactions were put through in any maturity. For all periods from sixty days to six months the rate remained unchanged at 4¾ per cent to 5 per cent. The prime commercial rate continued to be quoted at 4½ per cent to 4¾ per cent.

For the year 1922 business failures in the United States totaled 22,400, the largest number recorded in the history of the country, an increase of 11.9 per cent over failure in 1921, and an increase of 164 per cent over those of 1920. The liabilities involved, however, amounted to \$646,955,633, or 14 per cent less than in 1921, but they were 51 per cent greater than in 1920. The liabilities for 1922 were the second largest in the history of the country.

Bradstreet's food index number, based on the wholesale prices per pound of 31 articles used for food, was \$3.48 for last week, as compared with \$3.50 for the preceding week and \$2.92 for the week ended Dec. 29, 1921. Last week's index number marked a decrease of five-tenths of 1 per cent from the preceding week, but a gain of 19.1 per cent over the corresponding week in 1921.

Revenue freight loadings for the week ended Dec. 16 totaled 888,082 cars. Due to seasonal factors this represented a decrease of 31,746 cars from the week before, but it was an increase of 162,008 cars over the corresponding week a year ago.

Winter Driving Helped Stewart-Warner Sales

CHICAGO, Dec. 30.—Closing the best year in its history, the Stewart-Warner Speedometer Corp. reports that December sales have been such that all indications are that this month will be second only to June in volume. The unusually large volume of sales experienced by the company through the fourth quarter of the year has caused genuine surprise to the officials who attribute it largely to the great increase in winter driving.

Sales of the company for the first nine months of 1922 showed an increase of 83 per cent over the corresponding period of 1921 and 16 per cent over the corresponding period of 1920.

Sales in June of this year were the largest of any month in the company's history, having exceeded by 13 per cent the volume of the next best month which was May, 1920. A noticeable feature of this year's business is the fact that sales of automotive equipment for retail distribution have been as well maintained as sales to car manufacturers.

Ternstedt's Output Gained 9000 Per Cent

**Big Increase in Four Years—Business in 1922 Exceeded
\$10,000,000**

DETROIT, Dec. 30—Figures disclosed at the fourth annual dinner of the Ternstedt Manufacturing Co., builder of body hardware and stampings, show a production increase of 9000 per cent in its four years of existence, and typifies the increase in the closed body business in the industry. The company specializes to a large extent in hardware for closed bodies.

Business in the first year totaled \$93,000 and in the year just closing will exceed \$10,000,000. President Paul W. Seiler said that 1923 will show a large increase over 1922, and in preparation for this the company has recently completed large additions to its manufacturing facilities. From a floor space of 9000 sq. ft. in 1917 the company has grown to 618,000 sq. ft., increasing the total in the last year from 205,000 sq. ft. The company is now employing 3000 men.

The dinner was held at the Statler for the department heads of the company and was given by Seiler in appreciation of the cooperation of his men. Speeches were made by T. P. Archer, factory manager; D. E. Humphrey, sales manager; F. M. Edgar, chief engineer; M. T. Boden, treasurer; Frank Wilson, assistant factory manager; W. A. Fisher, Fisher Body Corp.; Paul W. Seiler, president.

A feature of the evening was the cutting during Seiler's talk of a large birthday cake which, layer by layer, showed the growth of the company in its four years. As each layer opened, the plant buildings of that year were shown electrically illuminated in its interior. The arrangements for the dinner and entertainment were in the hands of R. M. Miller, advertising manager.

Ford Takes Over Timber Properties in Michigan

DETROIT, Dec. 29—Ford Motor Co. has taken over the Stearns & Culver Co.'s timber holdings in Baraga County, this State, and the mill operated by that company at L'Anse. The holdings embrace about 30,000 acres of timber land in Baraga and adjacent counties, in addition to about 15,000,000 feet of manufactured lumber. Date when the Ford company will take possession has not been fixed, pending completion of details of the deal.

The reason for the Ford company taking over the timber properties and the L'Anse mill is that they were closer to some of his former timber holdings than his present mill at Iron Mountain. The mill at Iron Mountain is the most complete and largest in the Upper Peninsula

and the L'Anse mill is its closest rival. The Stearns-Culver Co. will continue operations at other large holdings at Lake Linden, Upper Peninsula.

L'Anse is one of the oldest towns in the peninsula section and was once a busy lake port. It is located at the extreme end of Keweenaw Bay and with railroad connections from Iron Mountain will provide shipping facilities by boat with the Ford factories in Detroit. The plant there was taken over by Stearns-Culver seven years ago after it had been considered more or less of a failure from a lumber point of view and has been successfully operated.

INDUSTRIAL NOTES

Front Drive Motor Co. announces the consolidation and removal of its office and factory to 2131-33 Washington Street, Kansas City, Mo. and the installation of new machinery and additional equipment.

Double Fabric Tire Co. has changed its name to the Auburn Rubber Co. The change in no way affects the financial standing or policies of the company, or changes its ownership in any way.

B. M. Asch & Co. direct factory representatives have moved from 16 West Sixty-First Street to new quarters at 17 West Sixtieth Street, New York.

Ford Built 131,485 Cars and Trucks in November

DETROIT, Jan. 2—Final figures for Ford domestic plants in November show a production of 121,968 cars and trucks. The production of the six foreign plants of the company was 6354, and this, with an output of 3163 in the Canadian plant, gave a total output of all plants of 131,485. The tractor plant at the River Rouge built 5113 tractors in the month. Total Fordson production for 11 months, including the Cork plant total, was 63,007. The same period in 1921 totals 36,469.

Four of the six foreign plants built more cars in November than in October, these being Buenos Aires, Copenhagen, Cadiz and Sao Paulo; the Canadian output also represented an increase. Production in each of the foreign plants was: Manchester, 1569; Buenos Aires, 1490; Copenhagen, 1200; Bordeaux, 964; Cadiz, 697, and Sao Paulo, 434.

Ford's River Rouge plant in 1922 required 652,000 tons of coal for the production of 496,000 tons of coke for its ovens, the coke product increasing 120,000 tons over the former years. Its list of by-products showed similar increases.

PHILADELPHIA TRADE BETTER

PHILADELPHIA, Dec. 30—Automobile accessory and tire dealers here generally report trade improved somewhat in the last few weeks. Sales of closed cars continue good. Used cars are moving slowly. Skilled mechanics are scarce and there is little unemployment.

METAL MARKETS

No better evidence that the first week of the new year finds the steel industry of good cheer could be had than the price situation which obtains in the sheet and sheet bar markets. Sheet bar producers in the Mahoning valley are no longer eager to book first quarter orders at the heretofore prevailing \$36.50 level. Some of the mills restrict orders at this price to January shipments to their regular customers and are seeking to obtain \$1 premium on shipments to be made in February and March. Others declare themselves completely out of the market at the \$36.50 price, but let it be understood that they might book some orders at \$37.50 to \$38.50.

These conditions in the sheet bar market are more or less reflected in the sheet market. None of the sheet mills is so encumbered with first quarter orders that it can not accept attractive first quarter business, but there is an all-around jockeying for position, none of the producers being anxious to commit his capacity at prices which he believes will be revised upward, and yet eager for a fair-sized backlog of orders in case this expectation fails to materialize. As a result of this market undercurrent, prices show somewhat more variation between mill and mill than they did a few weeks ago.

Some of the smaller rollers of full-finished automobile body sheets are holding out for a 5 cents base while most of the Pittsburgh district mills quote 4.85 cents. Rumor has it that some of the independents booked desirable business at the leading interest's price of 4.70 cents. In other words, the sheet market is again in the plastic state which has been in evidence at the beginning of the two last quarters of 1922. It is only fair, however, to state that no one expects lower prices, opinion being divided between unchanged and somewhat higher price levels. Automotive orders for cold-drawn steel bars continue at a gratifying rate, and in some instances individual commitments exceed 500 tons. Many of the producers have succeeded in covering their first quarter requirements of raw materials, viz. hot-rolled bars at 2 cents, so that the 2.50 cents base for the cold-drawn product is continued, although in some instances higher prices are granted on more exacting specifications. During the old year's closing days automotive consumers placed most of their orders for first quarter shipments of bolts and nuts.

Pig Iron.—Automotive foundries are increasing their melt, and although they have considerable iron due them on contracts made while the market was \$1 @ \$2 lower than it is now, astute buyers are following the price movement closely so as not to be caught in another squall when spring requirements call for attention.

Aluminum.—Arrival of 350 tons of aluminum from Norway reported to be intended for the domestic producer is interpreted in the trade as lending additional color to the report that a community of interests between the American and Norwegian producer is forming.

Copper.—The market opened the year quiet but steady. Reports that Ford was buying unusually heavy tonnages of copper wire are due to quotations being asked for material to electrify the Detroit, Toledo & Ironton Railroad, and not to abnormally increased consumption of copper wire in Ford cars.

Calendar

SHOWS

- Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.
- Jan. 8-13—New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.
- Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.
- Jan. 27-Feb. 3—Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

- Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquanteinaire.
- April - July, 1923—Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

RACES

- May 10—Berlin - Grunewald, German Grand Prix.

CONVENTIONS

- Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

- Jan. 29-31—Chicago, Annual Meeting, Automobile Electric Service Association, Congress Hotel.

- Feb. 15-16—Chicago, City Club, Winter Sectional Meeting of the American Society for Steel Treating; W. H. Eisenman, 4600 Prospect Avenue, Cleveland, national secretary.

- April 25, 26 and 27—New Orleans, Annual Convention of the National Foreign Trade Council.

S. A. E. MEETINGS

Metropolitan Section

- March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and

Flexible Vehicles for Street Railway Service.

- April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

- May 17—Speaker, F. P. Gilligan, Secretary, Henry Southern Engineering Co., Subject, Metallic Materials for Automotive Work.

Other Meetings

- Jan. 9-12—New York, Annual Meeting.

- Jan. 31—Chicago Meeting and Dinner of the Society at the Congress Hotel.

Chicago Optimistic Over Year's Outlook

CHICAGO, Jan. 2—The New Year is welcomed with optimism by the automotive merchants of Chicago and vicinity who foresee a continuance, and possible improvement, of the satisfactory volume of sales which has been maintained up to this time.

Although sales are by no means at the high point of last summer, they are not nearly so low as at this time last year and there are indications that a decided improvement will be noted from now on into next summer. The closed car demand has been insistent here as elsewhere and a number of dealers have been unable to get sufficient cars of this type to fill orders promptly. Many open cars have been equipped with California type tops and sold.

There was considerable giving of new automobiles for Christmas gifts, some of the higher priced vehicles figuring in this. But the greatest activity in winter sales is expected to come this month, with the distribution of dividends, bonuses and semi-annual incomes. Many persons already are looking forward to spring and some orders are being given for early spring delivery of motor cars. The number of such orders is expected to increase steadily.

Wagner Electric Winner in Stockholders' Action

ST. LOUIS, Dec. 30—Circuit Court Judge Hall today dismissed a petition for receivership filed by several stockholders of the Wagner Electric Manufacturing Co. and dissolved a temporary restraining order which prohibited the final ratification of the deal reorganizing the company.

In his ruling, the court said that the plaintiffs had ample warning of the reorganization and "were guilty of neglect" in not taking steps then if they believed action necessary. The opinion further held that the harm to new investors who had purchased securities of

the reorganized company would be much greater than any good the court might do in granting the petition.

In the reorganization, the Wagner company was incorporated under the laws of Delaware. Plaintiffs in the receivership case contended that the board of directors of the old corporation was dominated by the representatives of creditor banks. The court did not agree with this, stating that it was the duty of banks to watch closely the affairs of corporations in which they had invested clients' money.

At one time the Wagner company was reported to be \$5,000,000 in debt, but lately has greatly reduced its indebtedness. In 1920 it was doing a gross annual business of \$5,000,000.

Ruling of Akron Court Clears Goodyear Issues

AKRON, Jan. 3—The first blood in the four actions attacking the legality of the Goodyear Tire & Rubber Co.'s \$85,000,000 refinancing program was drawn by Goodyear stockholders today when Common Pleas Judge W. J. Ahern of Akron overruled a motion of Owen Young and Clarence Dillon of New York to have service of summons upon them quashed.

Judge Ahern today ruled that the two had been legally served under Ohio statutes and were now in the Ohio courts and parties defendant to the suit. The decision today clears the issues and brings the action against the management stock to a point where it can proceed to final argument and adjudication.

DEJON ELECTRIC FORMED

NEW YORK, Jan. 3—DeJon Electric Corp. has been incorporated in Delaware for \$500,000 to manufacture a high grade electrical system for automobiles. The factory at Poughkeepsie, N. Y., where the system will be produced, has been equipped with the most modern machinery, insuring accuracy of production.

Complete details of the incorporation have not been announced.

France Decrees Use of Alcohol Mixture

PARIS, Dec. 22 (by mail)—Four hundred members of the French Parliament, constituting the majority of that body, have approved the Government project making it compulsory to mix 10 per cent alcohol with all gasoline sold in France. The total amount of gasoline consumed in France during 1922 was 180 million American gallons. It is expected that the consumption will increase to 200 million gallons for 1923; but by adopting the alcohol mixture the amount of fuel to purchase abroad would not increase, it is stated.

French experts are of the opinion that the alcohol-gasoline mixture is the only solution available at the present time. A 50 per cent mixture of benzol-alcohol is being used by the Paris omnibuses, which already have covered 56 million miles on this fuel, but owing to the fact that practically all benzol supplies come from Germany this mixture cannot be obtained by the general public.

During the last six months all the army trucks attached to the Sevran-Livry powder works have run on a gasoline-alcohol mixture. Long tests showed that a fleet of trucks running on straight gasoline averaged 13.08 miles to the gallon; the same trucks running under the same conditions with 10 per cent alcohol mixed with the gasoline averaged 12.6 miles to the American gallon. Captain Buat, who had charge of these tests, reports that the percentage of alcohol can be increased to 45 without any change in the design of the engine, and without any appreciable increase in fuel consumption.

MOON BUILT 7500 IN 1922

ST. LOUIS, Jan. 4—Announcement was made yesterday by the Moon Motor Car Co. that its 1922 production was 7500 cars, approximately doubling the 1921 production. One of the features of the 1922 business was the fact that the company's turnover was between ten and eleven times.